Annual Reports of the Expl...
Officers of the Department ...
Agriculture, Bengal
1913-14 to 1917-18

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BOMBAY BRANCH
OF THE
ROYAL ASIATIC SOCIETY.
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ANNUAL REPORTS

OF THE

EXPERT OFFICERS OF THE DEPARTMENT OF AGRICULTURE, BENGAL,

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FOR THE YEAR ENDING

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30TH JUNE 1914. 1917-18

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ANNUAL REPORTS OF THE EXPERT OFFICERS OF THE DEPARTMENT OF AGRICULTURE, BENGAL, FOR THE YEAR ENDING 30TH JUNE 1914.

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ANNUAL REPORT OF THE DACCA AGRICULTURAL STATION FOR THE YEAR 1913-14.

1. Introduction.

The work of previous years was continued at this station during 1913-14, and as a result we are able to place another crop—jute—amongst the economical ones grown on this Farm. An average outturn of 17⅓ maunds of jute fibre per acre was obtained from 5½ acres of land. Winter rice worked out 16 maunds per acre on 62 acres. Autumn rice (*aus dhan*) yielded 13½ maunds per acre from 94½ acres. The season was very favourable to both autumn and winter rice, except that weeding of *aus* was retarded by the heavy rains of May. These yields per acre of *aman dhan* and *aus dhan* are not good enough, and must be charged to the poverty of the soil and partly to the Superintendent having to learn local conditions. As we now know definitley that the soils of both the high land and the low land are poor in organic matter, phosphoric acid, and lime, it will be easy to apply the remedy, *viz.* green-manures, bone mill, and lime

Sugarcane, both ratooned and newly planted, did not give such good returns per acre as in 1912; but this was caused by the low rainfall in April 1913, when only 4 inches were recorded instead of 9 in April 1912. This made planting on this land very difficult, uncertain, and late. On account of the adverse conditions early in the season, the ratooned crop was better than the newly planted cane.

Conditions on the low land are so irregular and ununiform that I doubt very much whether minute experimental work will ever be possible.

All *rabi* crops were very poor. This corroborates all former work, and shews that high land laterite area without irrigation is not suited to winter crops.

During the year, 28 maunds of jute seed and 53,380 sugarcane cuttings were distributed from this farm.

In 1913-14 eight apprentices received practical training at this Farm.

Financially the year was a great improvement on past years. In 1913-14 receipts were Rs. 11,313-9; while expenditure was Rs. 18,398-14-10 including Rs. 1,926-5-1 for experts, Rs 1,001-0-11 for treatment of an epidemic amongst the bullocks, Rs. 5,526-6-1 for supervision, and Rs. 600 for a house for the Chemist's Assistant.

This compares favourably with 1912-13, when receipts were Rs. 11,653-7-3 and expenditure Rs. 27,688-9-10; 1911-12, when receipts were Rs. 5,758-2-9 and expenditure Rs. 34,571-8-4; and 1910-11, when receipts were Rs. 4,264-0-6 and expenditure Rs. 57,303-11-3 (inclusive of Rs. 29,637-1-9 capital outlay).

From the work done at this Farm up to date we are able to make the following recommendations for the laterite area :—

1. Winter Rice (*Aman Dhan*).	...	A—Varieties	... (1) *Malati* (medium). (2) *Badshabhog* (fine). (3) *Dadkhani* (fine).
		B—Manures	... (1) 50 maunds cowdung per acre. (2) 3 maunds bonemeal per acre. (3) *Dhaincha* green-manured. 5 maunds lime per acre. (4) Combination (1) and (2). (5) Ditto (2) and (3). (6) Fish manure.
2. Autumn Rice (*Aus Dhan*).	...	A—Variety	... *Boaljhuri* (white rice).
		B—Manures	... (1) 50 maunds cowdung per acre. (2) 3 maunds bonemeal per acre. (3) *Dhaincha* green-manured. Lime 5 maunds per acre.
3. Sugarcane	...	A—Varieties	... (1) *Gandheri.* (2) Barbadoes No. 147 B. (3) Striped *Tanna.* (4) Yellow *Tanna.* (5) Barbadoes No. 208 B.
		B—Manures	... Lime 10 maunds. 200 maunds cowdung. 8 maunds castor-cake.
		C—Cultivation	... Ridge and furrow system.
4. Jute	...	A—Variety	: *Olitorius.*
		B—Manures	: (1) 200 maunds cowdung per acre. (2) 8 maunds castor-cake. Lime the previous crop of cane.

5. Potatoes	...	A—Variety	... Italian.
		B—Manures	... (1) 20 maunds castor-cake per-acre. (2) 200 maunds cowdung. 2 maunds super. 1 maund sulphate of ammonia per acre.

2. Situation and Brief History.

This station is situated at Manipur, 5 miles out of Dacca; is representative of a large laterite tract in the Dacca district known as the Madhupur jungle; and is remarkable for the rapidity with which water drains away. The land was acquired in 1906, when most of the high land was under jungle and thatching grass.

3. Area.

The area of the Farm is 353·7 acres, and of this 283 acres are high while 70½ acres are low land. Most of this in 1906 was under jungle; but yearly reclamation work has been undertaken until at present the high area consists of 141 acres under cultivation, while 123 acres are taken up by buildings, roads, tanks, botanical area and paddocks, so that practically speaking the whole Farm is now under cultivation. The low land is all under cultivation.

4. Irrigation.

With the exception of wells there is as yet no artificial irrigation on this Farm. The normal rainfall of the district is 72 inches, and this is spread well over the period from March to October, so that the ordinary crops of *aus* and *aman* paddy are assured.

The high land cakes as hard as a brick in December, and grows good crops of jute, *aus* paddy and sugarcane with heavy manuring; but with irrigation excellent crops of potatoes, tomatoes, and vegetables can be grown.

The low lands remain moist till December, and yield good crops of *aman* paddy without irrigation.

5. Character of the Soil.

Two types of land are represented, high and low. The soil of both are acid, and poor in organic matter, phosphoric acid and lime. Hence liming, bones, cowdung, and green-manures ought to give excellent results. The low land, owing to accumulation of water, is suited to winter rice; while the high land is suited to autumn rice, sugarcane and jute. Potatoes grow well under irrigation.

6. Meteorology.

The season, which recorded 16 inches of rain above the normal, was unfavourable for sugarcane, but very favourable for rice and jute. Less rain in May would have facilitated weeding of jute and *aus* paddy.

The following table gives the actual rainfall and number of rainy days on the Dacca Farm with the normal rainfall of the Dacca district:—

Rainfall, Dacca Farm.

	Actual.	Number of rainy days.	Normal.	Normal number of rainy days.
1913.	Inches.		Inches.	
January ...	.....	.....	0·38	·9
February ...	3·26	5	1·12	1·8
March ...	3·68	4	2·59	3·5
April ...	4·00	6	4·88	6·7
May ...	13·16	19	9·60	11·3
June ...	21·40	23	13 38	15·2
July ...	13·09	24	12·85	17·4
August ...	19·25	20	12·55	17·4
September ..	4·45	14	9·43	11·7
October ...	2·56	7	4·34	5·8
November ...	1·21	2	0·81	1·1
December ...	·62	3	0·15	0·4
1914.				
January ...	.....	.....		
February ...	4·09	5		
March ...	1·89	1		

TEMPERATURES.

	Inside.		Outside.	
	Maximum.	Minimum.	Maximum.	Minimum.
1913.				
April ...	93·10	70·50	101·40	69·00
May ...	90·48	78·7	92·35	75·61
June ...	86·00	79·23	86·36	77·70
July ...	90 41	81·87	91·19	79·38
August ...	89·48	81·61	89·71	79·41
September ...	88·50	81·80	93·00	82·0
October ...	90·0	77·80	91·87	74,67
November ...	84·90	67·40	88·50	63·5
December ...	79·0	60·9	81·0	57·8
1914.				
January ...	79·38	58·32	83·23	55·23
February ...	83·67	65·71	86·35	61·35
March ...	90·9	72·38	93·48	68·77

7. OPERATIONS DURING THE YEAR.

A.—General Crops grown.

The following table gives the area of each crop grown on the Farm during 1912-13 with the total outturn and yield per acre :—

Crop.	Area sown.	Total out turn. (1 md.=82 lbs.)	Yield per acre. (1 acre=3 bighas.)	Remarks.
	Acres.	Maunds.	Maunds.	
Winter rice (*Aman Dhan*).	62⅕	1,003	16½	Fair.
Autumn rice (*Aus Dhan*).	94½	1,288½	13⅔	Do.
Sugarcane—				
(*a*) New crop ...	5	118	23½	In addition to *gur*, 53,380 cuttings were supplied.
(*b*) Ratooned ...	5½	193½	34¾	
Jute ...	11⅓	135	12	Fair.
Do. ...	5⅓	92	17⅓	Good.
Niger ...	11½	28¾	2½	Bad.
Mustard ...	15	39¼	2¾	Do.
Til ...	4	2½	½	Do.
Rahar ...	9½	7	⅞	Do.
Potatoes (irrigated ...	⅔	61½	92	Pilfered.
Tomatoes (do.)	⅔	grew very well		Do.

From these figures it will be seen that winter rice, summer rice, sugarcane, jute and potatoes gave fair returns. *Niger*, mustard, *til*, *rahar*, cowpeas, soy bean, *i.e.*, all cold weather crops, without irrigation produce nothing worth consideration.

B.—Experimental Work.

This work is divided into—

(1) Winter rice (*aman dhan*).
(2) Autumn rice (*aus dhan*).
(3) Sugarcane.
(4) Jute.
(5) Botanical area, 14 acres.
(6) Area devoted to fibre plants, 11·57 acres.
(7) Area devoted to Agricultural Chemist, 6·32 acres.

Nos. (5), (6), and (7) are under the Economic Botanist, Fibre Expert, and Agricultural Chemist, respectively, who deal personally with these areas in their annual reports. In addition to this during the year under report 8·22 acres were allotted to Mr. Hector for his varietal work on rice.

(1) Winter rice (Aman Dhan)—

Dacca Firm, Aman *Paldy (Winter Rice) transplanted 1912.*

Variety.	1912-13. Area	1912-13. Out-turn.	1912-13. Yield per acre.	1913-14. Area.	1913-14. Out-turn.	1913-14. Yield per acre.
	Acres.	Mds.	Mds.	Acres.	Mds.	Mds.
(1) *Malati* ...	12⅔	295	23¼	33	673½	20½
(2) *Karticsal* ...	7	142	20⅓	20⅘	215½	10¼
Red Medium—						
(3) *Lalbalam* ...	6⅓	141½	23	⅗	1½	2½
(4) *Chaplash* ...	5½	117⅙	20	⅘	8¾	10¼
Coarse Red—						
(5) *Lohadang* ...	5½	158	28½	½	1⅜	3½
(6) *Hutishal* ...	3½	55½	15⅘	..	..	...
(7) *Chinigura* ...	6½	104	16	2⅓	25⅜	10⅕
(8) *Manikimdaura* ...	½	11	22	1/10	2¼	22½
(9) *Gobindabhog* ...	⅛	10¼	20½	⅕	1¼	6¼
(10) *Kataribhog* ..	½	16	32	...	...	...
(11) *Khalajoha* ...	½	8½	17	¼	2¼	11¼
(12) *Kalijira* ...	¼	4½	18	⅕	4½	22½
(13) *Badshabhog* ...	8/10	8	26	1/10	4¼	42½
(14) *Dadkhani* ...	⅔	13	19½	1/10	1¾	17½
(15) *Tulsimala* ...	⅖	6½	16	⅖	8½	22½

Malati Dhan yields medium-grained white rice. 11 per cent. of Farm seed are red.

Dadkhani yields fine-grained white rice. Seed is pure.

Badsabhog yields fine-grained white rice. Seed is pure.

Selection of seed will be carried out. There is no doubt whatsoever that *malati* is the best general purpose rice for this Farm.

Winter Rice—Aman Dhan—The following experiments have been carried out on this crop :—

(1) Variety—Object—To find out the most prolific variety for this Farm. See above.

(2) Manurial—Object—To find out the most economical application of manure for this Farm.

(3) Manurial Residues.—Object—To find out what manurial residues are left by certain manures and for how many years effect is appreciable.

(4) Methods of Cultivation.—Object—To find out first whether ploughing immediately after harvesting of rice is more advantageous than ploughing in June; second to find out what number of seedlings per whole in transplanting is the most economical practice for this Farm; and third thick and thin sowing of seed in seed-beds: To find out whether sowing seed in seed-beds thickly or thinly affects the seedlings and eventually the outturns. The winter rice land of this Farm is so uneven, so ununiform, and so irregularly distributed in peculiar shaped plots at different levels that it is very difficult to choose any piece of land, however small, with similar conditions for experimental work. We did the best we could under the circumstances and carried out the above experiments, but the results all show that we have been dealing with ununiform conditions. For example, in the manurial experiment the unmanured plot yielded the highest outturn; in the manurial residue experiment one of the unmanured plots gave an outturn so much higher than most of the other plots that figures must be considered misleading.

(2) Autumn Rice (*Aus Dhan*)—

Varieties.—The following varieties of *aus dhan* were sown broadcast in April, and the crop was ready for harvesting in July-August.

The following table gives full details of variety, area, outturn, and yield per acre in each case:—

Autumn Rice (*Aus* Paddy.)	Varieties, 1912.			Varieties, 1913.		
	Area in acres.	Outturn.	Yield per acre.	Area in acres.	Outturn.	Yield per acre.
		Mds.	Mds.		Mds.	Mds.
(1) *Puki* ...	23	266	11½	19½	235	12
(2) *Moishlum* ...	6⅓	94½	14	5	77½	15½
(3) *Boaljhuri* ...	16½	302	18⅓	8	112	14
(4) *Larcose* ...	4⅓	122	28⅓	28½	375½	13
(5) *Surjamukhi* ...	16½	392½	23⅝	22½	380	16¾
(6) *Fulbadam* ...	8	137	17	4	48¼	12
(7) *Pankaiji* ...	9⅔	188¼	20	...	.....	.....
(8) *Gorfa* ...	10	229¾	23	4	43½	11
(9) Central Provinces fine.	6½	65	10	1⅓	14¼	10½

Boaljhuri produces large white fine-grained rice, but 23 per cent. of Farm seed have become red.

Puki is an early variety of *aus* rice suitable for low lands to be followed in the same year by transplanted winter rice. The rice is red.

Larcose produces red-grained rice.

Surjamukhi produces reddish rice.

Central Provinces Aus.—Farm seed now has 50 per cent. red-grained rice.

All red rices will be excluded from the Farm to prevent white rices from being affected.

Rotation of Aus and Aman Paddy in the one year.—This is a common agricultural practice in the Dacca and Chittagong Divisions.

The following table shows the yields of *aus* (autum rice) and *aman* (winter rice) in 1913:—

Area.	Aus (puki) paddy yield per acre.	Aman paddy yield per acre.
Acres.	Mds.	Mds.
19½	12	9

The ideal rotation for such land should be jute followed by rice.

(3) Sugarcane—Sugarcane did not do so well on this Farm in 1913. In 1912 some phenomenal results were obtained on small areas, and doubt was expressed at the time whether such suitable conditions as in 1912 would always be present at planting time. April is the critical month on this Farm for cane; and in 1912, 9 inches of rain were recorded and enabled the crop to make a good start. In 1913 however only 4 inches were recorded in April, and the soil never became freely workable, with the result that the crop was prevented from thriving early in the season. This is further demonstrated by the fact that in 1913 ratooned cane was a much larger and luxuriant crop than the newly planted cane.

This is again supported by the crop of 1914, which was very flourishing in June 1914, and where nearly 9 inches of rain were recorded in April.

The following table of rainfall explains the above more fully. The cane crops of 1911 and 1913 were poor, while that of 1912 was very good and that of 1914 is very promising.

The following table gives details:—

	Normal.	1914.	1913.	1912.	1911.
	Inches.	Inches.	Inches.	Inches.	Inches.
January ...	0·38	.....	.....	.....	.....
February ...	1·12	4·09	3·26	.....	.....
March ...	2·59	1·89	3·68	1·21	.....
April ...	4·88	8·73	4·00	9·00	4·78
May	9·60	15·05	13·16	6·66	21·67
June ...	13·38	4·32	21·40	24·40	23·56
Total	31·95	34·08	45·50	41·27	50·01

The following table shows areas, outturns, and yields per acre in 1911, 1912 and 1913 :—

Sugarcane, Dacca Farm.

	Area.	Outturn, (1 md = 82 lbs.)	*Gur.* Yield per acre. (1 md = 82 lbs.)
	Acres.	Mds.	Mds.
1911—Newly planted crop	1	21	21
Ratooned ...	$5\frac{1}{3}$	150	30
1912—Newly planted crop	$5\frac{1}{2}$	344	$61\frac{4}{5}$
Ratooned ...	$5\frac{1}{3}$	$215\frac{1}{8}$	$40\frac{1}{3}$
1913—Newly planted crop	5	118	$23\frac{1}{2}$
Ratooned ...	$5\frac{1}{2}$	$193\frac{1}{4}$	$34\frac{3}{4}$

The new crop in 1913 was in reality not so bad, as 53,000 cuttings were distributed in addition to the *gur* manufactured. We had such a big demand for canes that we had to employ whole canes for the purpose of seed supply.

The following interesting report by Mr. Annet, Agricultural Chemist, on the canes of this Farm corroborates what we have found out on a large scale. I agree with his conclusions in every respect, and recommend Striped *Tanna*, yellow *Tanna*, B 147 and B 208 to local cultivators.

Jute—Prior to 1913 jute has not been a very successful crop on this Farm. This has been attributed to the poverty of the high land. In 1913 a very good crop was grown after sugarcane which had been heavily manured in 1912.

The following table gives details for 1911, 1912, and 1913 :—

Variety.	Area.	Outturn (1 md. = 82 lbs.)	Yield per acre.
	Acres.	Mds.	Mds.
1913—Chinsurah *Olitorius*	$5\frac{1}{8}$	$92\frac{3}{4}$	$17\frac{1}{2}$
Ditto ...	$2\frac{1}{10}$	$17\frac{3}{4}$ seed	$8\frac{1}{3}$
Capsularies ...	$2\frac{2}{3}$	$23\frac{1}{4}$	$8\frac{3}{4}$
	$\frac{9}{10}$	$1\frac{1}{4}$ seed	$1\frac{1}{4}$
1912 *Ditto* ...	$1\frac{2}{3}$	18	11
1911 *Ditto* ...	5	$35\frac{3}{4}$	7

From these figures it is evident that *Olitorius* jute is much more suited to this Farm than *Capsularies*.

It is very probable that the previous crop of cane had more to do with the ameliorating of the soil than anything else, and enabled a good crop of jute to be produced. The season was favourable to the jute crop.

Potatoes and Tomatoes—These crops were grown under irrigation and throve very well. Italian potatoes were employed.

Rabi Crops—There is nothing to report on these crops. The yields per acre show that they were uneconomical. In fact, the high land of this Farm is not suited to crops from December to March inclusive unless artificial irrigation is resorted to. With very heavy expenditure on manures crops may be grown; but it is not an economical practice.

C.—Conservation of Cattle-dung.

Dung was pitted and compared with unpitted manure on rice. The result was in favour of pitted manure by $2\frac{3}{4}$ maunds grain per acre.

D.—Distribution of Seeds, Manures, etc.

During the year the following seeds, manures, and implements were distributed from this Farm :—

Winter rice	...	...	$13\frac{1}{2}$ Mds.
Aus and *boro* rice	...	...	$210\frac{1}{2}$,,
Jute	...	...	$28\frac{1}{4}$,,
Sugarcane	...	...	53,380 cuttings.
Bonemeal	...	...	$336\frac{1}{2}$ Mds.
Planet Junior Hand Hoe		...	1

"Five varieties of cane were grown on the Dacca Farm in the season 1913-14.

Each variety was grown on triplicate plots, each of which was $\frac{1}{10}$ acre in area. The total area of the plant sugarcane experiment was therefore $1\frac{1}{2}$ acres. Ratoon canes were also grown, but these were not examined chemically.

The accompanying table shows the general results obtained from each plot of each of the varieties. The figures quoted are yield per acre of stripped cane in tons, percentage of juice extracted in a 3-roller iron mill, percentage of cane sugar and of reducing sugar in juice, and finally the total sugar per acre in the extracted juice.

Plot.	Stripped cane per acre.	Percentage of juice extracted	Percentage of cane sugar.	Percentage of reducing sugar.	Total sugar.	Total sugar per acre in extracted juice.
	Tons.					Pounds.
Yellow *Tanna*—Plot I ..	13·83	70·34	13·95	2·38	16·33	3,557
II ...	16·13	79·47	14·65	2·26	16·91	4,855
III ..	10·50	66·08	14 29	2·09	16·38	2,545
Striped *Tanna* „ I ...	13·02	73·78	13·02	2·73	15·75	3,388
II ...	17·34	69·05	12·64	3·20	15·84	4,249
III ..	14·40	69·10	12·66	2·99	15·65	3,499
B 208 „ I ...	5·16	65·99	17·90	1·00	18·90	1,440
II ..	5·05	62 33.	19 28	0·80	20·08	1,414
III ..	5·87	66·79	18·69	0·80	19·49	1,713
B 147 „ I ..	12·00	54·53	16·67	1·60	18·27	2,674
II ...	6·23	71·09	16·92	1·32	18·24	1,810
III ...	13·91	68·81	15·83	1·97	17 80	3,820
Dacca *Gandheri* „ I ...	7·38	69·37	14 75	2·99	17·14	1,966
II ...	5·65	66·36	15·89	2·24	18·13	1,522
III ...	6·85	71·38	13·84	2·52	16·36	1,520

CONCLUSIONS.

A.—As regards the amount of sugar in the juice the order of the five varieties is as follows:—

(1) B 208.
(2) B 147.
(3) Dacca *Gandheri* and Yellow *Tanna* about equal.
( ) Striped *Tanna*.

B.—With reference to the amount of sugar extracted per acre the varieties came out in the following order:—

(1) Striped *Tanna* and Yellow *Tanna* about equal.
(2) B 147.
(3) Dacca *Gandheri*.
(4) B 208.

It must be remarked however that Plot II of B 147 was very abnormal. Extended trials would probably show B 147 to be as high a yielder as Striped and Yellow *Tanna*.

B 208 was badly attacked by jackals when young, and this explains its very low yield.

C.—The general conclusion from the experiments is that the local cane Dacca *Gandheri* is a long way inferior to three of the other four varieties grown, and that if B 208 were well protected from jackals, then it too would be superior to Dacca *Gandheri*. The experiment warrants the trial on a larger scale of Yellow *Tanna* and B 147. Striped *Tanna* also gives a high acreage outturn of sugar, but its juice contains a very high proportion of reducing sugar."

The following is a statement of expenditure and receipts for this work in 1913-14:—

Expenditure.

	Rs.	A.	P.
Seeds	110	0	0
Manures ...	1,048	2	0
Implements	.....		
Contingencies ...	267	3	3
Total ...	1,425	5	3

Receipts.

	Rs.	A.	P.
Seeds	230	5	3
Manures	33	7	0
Implements	26	4	0
Miscellaneous	19	8	0
Total ...	309	8	3

Bills outstanding.

Manures	814	7	0
Seeds	33	5	9
Miscellaneous	58	4	0
Total ...	906	0	9
Stock in hand	419	6	3

The following table shows receipts and expenditure for seeds, manures, and implements distributed from the Dacca Farm for the past six years. Since April 1912 potatoes and bonemeal have been dealt with from Calcutta.

Statement of Expenditure on Seeds, Manures, and Implements distributed from the Dacca Farm.

	1908-09.	1909-10.	1910-11.	1911-12.	1912-13.	1913-14.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A.	Rs. A. P.
Establishment ...	1,539 8 0	3,580 1 4	not	1,672 9 10	.....	.....
Contingencies ...	1,366 15 2	875 8 0	available	250 0 0	307 1 10	267 3 3
Seeds, manures, and implements.	1,455 13 0	5,010 4 0	757 6 3	6,698 8 11	932 5 9	1,158 2 0
Grand total ...	4,362 4 2	9,465 13 4	757 6 3	8,621 2 9	1,239 7 7	1,425 5 3

Receipts.

1908-09.	1909-10.	1910-11	1911-12.	1912-13.	1913-14.
Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
559 14 6	828 11 10	.....	2,453 13 6	2,408 8 9	309 8 3

	Rs.	A.	P.
Outstanding bills	906	0	9
Stock in hand, 1st April 1914	419	6	3

E.—Practical Training of Young Men.

During the year eight men received practical training at this Farm.

F.—Cattle-disease.

A disease, not yet scientifically identified but which affects the glands of the shoulders and hips, broke out among the Farm cattle in October 1913. Gradually most of the Farm bullocks were affected. Two died of the disease, and the rest recovered only after prolonged treatment. The total cost of the treatment in labour, medicines and sick diet, came up to Rs. 1,002-0-11.

8. Poultry.

	Number in hand on 1st April 1913.	Number in hand on 31st March 1914.	Number distributed during the year 1913-14.	Number dead during the year 1913-14.	Number added during the year 1913-14.	Remarks.
Hens and cocks.	45	30	8	16	9	The death-rate was very high.
Chickens	12	26	Nil	97	14	

The total expenditure incurred during the year for feed and keep of poultry was Rs. 169-4-11, and receipts from sale of birds and eggs Rs. 111-15-6; the corresponding figures for the previous year being receipts Rs. 157-5-6, and expenditure Rs. 727.

9. Receipts and Expenditure.

During the year April 1913 to March 1914 the Farm receipts apart from Seed Store account were Rs. 11,313-9 inclusive of Rs. 842-15-1 from experts; while Rs. 18,398-14 were incurred as expenditure. This compares favourably with receipts Rs. 11,653-7-3 and expenditure Rs. 27,688-14-10 for April 1912 to March 1913.

Details of expenditure.

	Rs	A.	P.
Farm establishment	5,526	6	1
Permanent Improvements	501	6	0
Labour	7,909	5	9
Cattle food	1,269	10	3
Repairs	786	7	0
Implements, seeds, manures	941	3	6
Miscellaneous	1,464	8	3
Total ...	18,398	14	10

The expenditure includes Rs. 1,926-5-1 incurred on account of experts; Rs. 1,002 for treatment of bullocks owing to an epidemic; and Rs. 600 spent on the house of an Assistant to the Agricultural Chemist.

10. Acknowledgments.

I have to thank Mr. Annett, Agricultural Chemist, for his help in connection with sugarcane.

11. Management.

The Farm is managed by the Agricultural Department, Bengal. Babu Kali Das Roy, the permanent Superintendent, went on leave on 3rd April 1913, when M. A. Razak, Overseer, took charge from 3rd April to 18th May 1913, from which date the Farm has been under the management of Babu Tara Nath Roy. During the year Mr. Blackwood, Director of Agriculture, inspected the Farm twice, and the Deputy Director of Agriculture made frequent inspections.

Visits were paid by His Excellency the Governor of Bengal, the Hon'ble Mr. P. C. Lyon, the Hon'ble Mr. Shams-ul-Huda, the Hon'ble Mr. J. G. Cumming, and Mr. MacKenna, Agricultural Adviser to the Government of India.

F. Smith,
Deputy Director of Agriculture, Bengal.

Manurial Residues.—The previous figures are given for reference:—

Per acre—Average of duplicate plots.

Manures applied, 1908-09.	Average of 1908-09.		1910, without manure.		1911, without manure.		1912, without manure.	
	Yield							
	Grain	Straw.	Grain.	Straw.	Grain	Straw.	Grain.	Straw.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Green manure (*dhaincha*) ...	24	32	19	12¾	22	50	16	32
Green manure (*sunn* hemp) ...	14	17½	14½	10½	19	34	15½	31½
Unmanured	17	25¾	12	14	19½	47	12½	24
Bonemeal 3 maunds ...	24	44¾	25	18½	25¾	62½	19½	50
Bonemeal 3 maunds and saltpetre 30 seers.	23½	40½	22½	19	23	62¾	19	35
Bonemeal 3 maunds and ammonium sulphate.	22½	41	26	20	20¾	45¾	16½	23
Bonemeal 3 maunds and calcium nitrate.	26½	38	26	22	24½	54	20	24
Bonemeal 3 maunds and cotton seed.	24	39½	25½	22½	23½	56½	20	32
Fish manure	32½	35	21½	22½	18½	37½	16	34

EAST RAVINE.

Manurial Residues in 1913-14.

Serial No.	MANURE.	No. of plot.	Weight of grain per acre.	Weight of straw per acre.	Outturn of grain per plot.	Outturn of straw per plot.	Actual area of plot.
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Acres.
1	*Dhaincha* green-manured.	1	24 26 3	45 13 2	4 27 6	8 24 8	·19
2	*Dhaincha* green-manured.	2	36 26 7	32 18 8	3 12 0	2 38 12	·09
3	*Sunn* hemp green-manured.	3	23 22 4	32 3 3	5 9 8	7 2 4	·22
4	*Sunn* hemp green-manured.	4	20 6 15	27 25 9	3 25 4	4 39 0	·18
5	Unmanured ...	5	19 10 0	23 21 4	3 34 2	4 28 4	·2
6	Ditto ...	6	20 3 7	30 17 13	2 32 8	4 10 8	·14
7	Bonemeal ...	7	27 20 11	38 33 15	5 9 2	7 15 4	·19
8	Bonemeal and saltpetre.	8	26 28 12	41 18 5	4 32 6	7 18 8	·18
9	Bonemeal and saltpetre.	9	27 20 0	41 26 11	3 12 0	5 0 0	·12
10	Bonemeal and calcium nitrate.	10	28 9 3	38 9 3	3 15 8	4 23 8	·12
11	Bonemeal and cotton seeds.	11	29 27 8	40 27 12	5 13 12	7 13 0	·18
12	Bonemeal and cotton cake.	12	37 3 0	44 6 11	4 17 0	5 12 0	·12
13	Bonemeal ...	13	27 20 0	37 39 3	3 23 4	4 37 8	·13
14	Fish manure ...	14	22 11 11	28 18 14	4 0 8	5 5 0	·18
15	Unmanured ...	15	28 5 0	62 20 0	2 10 0	5 0 0	·08
16	Fish manure ...	16	26 22 8	37 20 0	2 26 4	3 30 0	·1
17	Bonemeal and cotton cake.	17	27 13 12	25 0 0	4 15 0	4 0 0	·16
18	Bonemeal and cotton seeds.	18	25 26 3	45 15 13	4 35 0	8 25 0	·19
19	Bonemeal and calcium nitrate.	19	25 29 3	45 13 10	4 25 4	8 6 8	·18
20	Bonemeal and ammonium sulphate.	20	24 15 0	48 35 4	4 25 4	9 11 8	·19
21	Bonemeal and saltpetre.	21	21 22 8	36 10 0	3 18 0	5 32 0	·16
22	Bonemeal ...	22	21 32 1	38 6 8	3 28 4	6 19 8	·17
23	Unmanured ...	23	18 18 1	27 7 0	4 9 12	6 10 0	·23

* From this outturn it is evident we are dealing with ununiform conditions.

Zala B—Seed-bed Experiment.

Serial No.	Seedlings from—	No of plot.	Weight of grain per acre.	Weight of straw per acre.	Outturn of grain per plot.	Outturn of straw per plot.	Area in acres.
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	
1	2 maunds per acre	1	24 30 14	39 22 15	2 29 0	4 14 12	·11
2	1 maund ditto	2	24 34 3	34 1 8	3 9 4	4 17 0	·13
3	30 seers ditto	3	24 2 0	32 20 0	1 37 0	2 24 0	·08
4	20 seers ditto	4	19 36 2	34 1 0	2 23 8	4 17 0	·13
5	2 maunds ditto	5	22 18 3	43 37 0	1 22 14	3 3 0	·07
6	1 maund ditto	6	32 20 0	44 10 13	1 38 0	2 26 4	·06
7	30 seers ditto	7	21 15 9	22 39 7	3 34 0	4 7 8	·18
8	20 seers ditto	8	22 11 1	31 31 7	3 4 12	4 18 0	·14
9	2 maunds ditto	9	29 27 8	80 4 12	1 31 4	4 32 4	·06
10	1 maund ditto	10	30 6 4	75 21 14	2 16 8	6 1 12	·08
11	30 seers ditto	11	25 37 8	51 24 9	1 22 4	3 4 4	·06
12	20 seers ditto	12	25 31 4	47 13 12	2 2 8	3 31 8	·08

1 maund per acre gives the best yields.

Zala B—Manurial Experiment.

Serial No.	Manure.	No of plot.	Weight of grain per acre.	Weight of straw per acre.	Outturn of grain per plot.	Outturn of straw per plot.	Area of plot.
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Acres.
1	Unmanured ..	13	14 20 12	21 4 3	1 25 8	2 29 12	·07
2	150 maunds cow-dung per acre.	14	23 25 0	45 0 0	1 7 4	2 10 0	·05
3	*Dhaincha* green-manured.	15	23 6 9	46 4 7	2 4 2	4 6 0	·09
4	Unmanured ...	16	30 15 0	51 10 0	1 20 12	2 22 8	·05
5	150 maunds cow-dung per acre.	17	23 25 0	34 35 0	2 14 8	3 19 8	·1
6	*Dhaincha* green-manured.	18	19 38 14	35 27 6	2 7 14	3 37 0	·11
7	*Dhaincha* green-manured.	19A	23 21 11	53 17 7	2 33 0	6 16 8	·12
8	*Dhaincha* green-manured and lime 30 maunds.	19B	29 13 14	49 4 12	3 9 2	5 16 12	·11
9	Bonemeal 3 maunds	20A	20 0 0	38 16 8	2 24 0	4 39 12	·13
10	Ditto 3 maunds	20B	27 32 8	50 0 0	2 9 4	4 0 0	·08

It is evident we are dealing with very irregular conditions.

	Mds.	
Unmanured	22½	The unmanured plot is so high that none of the applications are economical.
Cowdung 150 maunds	23½	
Dhaincha green-manured ...	22¼	
Dhaincha green-manured and lime 30 maunds.	29¼	
Bonemeal	24	

Seed-beds.

Serial No.	Number of seedlings transplanted per hole.	No. of plot.	Weight of grain per acre.	Outturn per plot.		Area of plot.
				Grain.	Straw.	
			Mds. s. ch.	Mds. s. ch.	Mds. s ch.	Acres.
1	20 seers seed 1 seedling ...	27	26 20 0	2 15 0	3 8 0	·09
2	20 „ „ 2 „ ...	29 B	63 0 0	2 21 0	3 13 0	·04
3	20 „ „ 4 „ ...	31 B	29 4 4	2 1 8	3 13 0	·07
4	30 „ „ 1 „ ...	26	17 22 1	1 16 2	1 27 0	·06
5	30 „ „ 2 „ ...	29 A	42 25 0	2 5 4	2 34 0	·05
6	30 „ „ 4 „ ...	31 A	49 8 12	1 38 12	2 26 0	·04
7	40 „ „ 1 „ ...	25	22 20 0	1 23 0	2 0 0	·07
8	40 „ „ 2 „ ...	28 B	29 25 11	2 3 0	2 17 0	·07
9	40 „ „ 4 „ ..	30 B	30 30 3	3 27 10	4 31 0	·12
10	80 „ „ 1 „ ...	24	29 10 0	1 18 8	1 30 0	·07
11	80 „ „ 2 „ ...	28 A	33 5 0	1 39 8	2 23 0	·06
12	80 „ „ 4 „ ...	30 A	34 20 0	4 5 8	7 35 0	·12

Irregularity and ununiformity are very evident.

Office Ravine

Seedling Experiment.

Serial No.	Number of seedlings transplanted per hole.	No. of plot.	Weight of grain per acre	Weight of straw per acre.	Outturn per plot of grain.	Outturn per plot of straw.	Area in acres.
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	
1	From 20 seers seed-bed 1 seedling.	27	26 15 9	35 22 3	2 15 0	3 8 0	·09
2	From 2 maunds seed-bed 2 seedlings.	28A	33 5 0	47 36 0	1 39 8	2 23 0	·06
3	From 30 seers seed-bed single seedling.	26	17 22 1	27 36 11	1 16 2	1 27 0	·06
4	From 1 maund seed-bed 2 seedlings.	28B	29 25 11	34 25 11	2 3 0	2 17 0	·07
5	From 1 maund seed-bed 1 seedling.	25	22 20 0	28 23 0	1 23 0	2 0 0	·07
6	From 30 seers seed-bed 2 seedlings.	29A	42 25 0	57 0 0	2 5 4	2 34 0	·05
7	From 2 maunds seed-bed 1 seedling.	24	29 10 0	35 0 0	1 18 8	1 30 0	·07
8	From 20 seers seed-bed 2 seedlings.	29 B	63 5 0	66 29 0	2 21 0	3 13 0	·04
9	From 30 seers seed-bed 4 seedlings.	31A	49 8 12	66 10 0	1 38 12	2 26 0	·04
10	From 2 maunds seed-bed 4 seedlings.	30A	34 19 3	65 25 0	4 5 8	7 35 0	·12
11	From 20 seers seed-bed 4 seedlings.	31B	29 4 4	47 20 0	2 1 8	3 13 0	·07
12	From 1 maund seed-bed 4 seedlings.	30B	30 30 3	39 31 11	3 27 10	4 31 0	·12

East Raving.

Serial No.	Time of ploughing.	No. of plot.	Weight of grain per acre.	Weight of straw per acre.	Outturn per plot of grain.	Outturn per plot of straw.	Area in acres.
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	
1	Ploughed up at harvest time.	26, 29, 30	16 28 1	23 30 6	4 20 6	6 17 0	·27
2	Not ploughed up till June.	27, 28, 31	15 18 8	28 23 8	4 7 0	7 28 12	·27

Semti Low Land.

Serial No.	Time of ploughing.	No. of plot.	Winter.		*Aus.*		Area in acres.
			Weight of grain per acre.	Weight of straw per acre.	Weight of grain per acre.	Weight of straw per acre.	
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	
1	Ploughed up at harvest time.	3, 9, 12	10 2 0	22 16 8	9 7 4	.....	1*
2	Not ploughed up till June.	4, 8, 13	9 5 0	19 14 0	7 27 12	...	1*

* Rotation of *aus* rice and *aman* rice in one year.

North Hazi Low Land.

Raiyats' Cowdung versus *Farm-pitted Cowdung.*

Serial No.	Manure.	No. of plot.	Weight of grain per acre.	Weight of straw per acre.	Outturn per plot of grain.	Outturn per plot of straw.	Area in acres.
			Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	
1	Not manured ...	2	14 28 12	20 11 8	4 36 4	.....	·33
2	50 maunds farm cowdung.	5	11 29 8	22 9 8	3 36 8	.....	·33
3	150 maunds outside cowdung.	7	9 1 8	20 32 8	3 0 8	.....	·33

North Hazi.

Manurial Experiment—Rabi *Mustard.*

Serial No.	Reference No. of Map.	Plot No.	Weight of grain.	Weight of straw.	Serial No.	Reference No. of Map.	Plot No.	Weight of grain.	Weight of straw.
			Mds. s. ch.	Mds. s. ch.				Mds. s. ch.	Mds. s. ch.
1	North Hazi—Block A.	1A	0 0 2	0 1 12	1	North Hazi—Block B.	1A	0 0 6	0 0 11
		1B	0 4 6	0 17 4			1B	0 1 6	0 8 3
		1C	0 7 6	0 28 9			1C	0 4 2	0 22 6
		1D	0 5 14	0 18 3			1D	0 3 2	0 16 12
		2A	0 0 12	0 10 5			2A	0 3 8	0 19 1
		2B	0 18 4	1 6 6			2B	0 12 0	1 10 14
		2C	0 23 6	1 14 6			2C	0 18 4	1 14 6
		2D	0 11 0	0 23 0			2D	0 7 3	1 3 3
		3A	0 3 6	0 11 6			3A	0 6 12	0 37 8
		3B	0 16 4	1 2 14			3B	0 7 4	0 31 8
		3C	0 20 0	1 5 12			3C	0 15 6	0 34 12
		3D	0 10 0	0 28 8			3D	0 8 4	0 32 14
		4A	0 2 0	0 7 6			4A	0 8 4	1 5 4
		4B	0 19 8	1 4 6			4B	0 13 9	0 35 0
		4C	0 23 0	1 1 10			4C	0 22 8	1 27 0
		4D	0 11 6	0 28 12			4D	0 13 14	1 20 2

North Hazi.

Manurial Experiment—Rabi *Mustard.*

Serial No.	Reference No. of Map.	Plot No.	Weight of grain.	Weight of straw.	Serial No.	Reference No. of Map.	Plot No.	Weight of grain.	Weight of straw.
			Mds. s. ch.	Mds. s. ch.				Mds. s. ch.	Mds. s. ch.
1	North Hazi—Block C.	1A	0 0 2	0 0 14	1	North Hazi—Block D.	1A	0 0 2	0 0 12
		1B	0 2 2	0 11 6			1B	0 0 6	0 5 8
		1C	0 5 10	0 18 14			1C	0 7 0	0 27 10
		1D	0 1 12	0 6 14			1D	0 2 10	0 15 8
		2A	0 0 12	0 4 2			2A	0 0 10	0 4 12
		2B	0 10 0	0 27 14			2B	0 16 2	0 35 4
		2C	0 17 12	0 39 2			2C	0 18 10	1 6 12
		2D	0 8 0	0 26 10			2D	0 5 4	1 0 14
		3A	0 0 8	0 4 2			3A	0 0 12	0 5 4
		3B	0 8 1	0 21 5			3B	0 13 8	0 36 4
		3C	0 18 0	0 36 4			3C	0 16 0	1 2 14
		3D	0 6 8	0 20 0			3D	0 8 0	0 26 10
		4A	0 0 12	0 4 0			4A	0 4 2	0 15 0
		4B	0 14 12	0 27 10			4B	0 17 4	0 39 4
		4C	0 21 0	0 37 2			4C	0 15 4	2 8 10
		4D	0 10 12	0 25 0			4D	0 13 12	1 20 10

EXPERIMENTAL SCHEMES FOR THE DACCA FARM FOR 1914-15.

(i) *Dacca Farm.*

First Winter Rice—

(*A*) Seed selection.
(*B*) Variety experiment.
(*C*) Manurial experiment—Series 1 and 2.
(*D*) Methods of cultivation.

(*A*) *Seed selection.*—Seed selection will be carried out at this farm under the direct supervision of the Economic Botanist, Mr. G. P. Hector, with the primary object of improving yield and keeping up a supply of seed for distribution purposes.

Varietal selection will be continued as in previous years.

Intravarietal selection will be made on Maloty and Lohadang varieties of paddy. One hundred of the best single plants will be selected out by eye at harvest time, and seed will be kept separate till the sowing time of 1915.

(*B*) *Varieties*—½ acre each in duplicate.

The yielding capacity of the following varieties will be compared to find out which suit this soil and locality:—

(1) Maloty
(2) Lohadang
(3) Lalbalam
(4) Kataribhog
(5) Badshabhog
(6) Dadkhani
(7) Indussail
(8) Chinigura
(9) Lambachikan

} Manure—bonemeal 3 maunds per acre; same number of seedlings; not more than 4.

(*C*) *Manures—Series 1.*—Maloty variety, ¼ acre each—duplicate each plot.

The following manurial application will be compared to find out what is the most economical application for this kind of soil:—

C.—*Manures*—The following manurial applications will be compared to find out the most economical application for this soil and locality:—

Manure—Variety larcose—

(1)	Unmanured.		
(2)	Cowdung,	5 maunds	
(3)	Bonemeal,	3 „	
(4)	Cowdung,	30 „	
	Bonemeal,	3 „	
(5)	Cowdung,	50 „	
	Bonemeal,	3 „	
	Lime,	5 „	
(6)	Cowdung,	50 „	
	Lime,	5 „	

per acre ... Seed rate, 1 maund per acre; 15 acres each duplicate. No rabi. Plough and fallow.

D.—*Methods of cultivation.*—Surjumukhi, 1 acre each—

(*a*) *Seed rate.*—This experiment is to find out what is the most economical seed rate per acre for broadcasting *aus* paddy—

(*a*) 1 maund per acre
(*b*) ½ „ „
} Seed that sinks in saturated solution of salt.

(*b*) *Rotation.*—This experiment is to find out with what crops *aus* paddy can be rotated on the same land in the same year on low and high land respectively and at the same time find out the most economical practice for this soil and locality—

Low *aus* land:
(1) *Aus* paddy followed by *aman* } Bonemeal, 3 maunds.
(2) Jute followed by *aman* } Bonemeal, 3 „
(3) „ „ } Cowdung, 100 „
Lime 5, maunds per acre.

High *aus* land:
(4) *Aus* followed by niger
(5) „ til
(6) „ matikalai
(7) „ mustard
(8) *Aus* paddy followed by matikalai green manured and then mustard.
} Bonemeal, 3 maunds.

(3) *Seedlings, 1 acre each.*—This experiment is to test what number of seedlings is the most economical to employ in transplanting rice.

Plough up immediately after harvest.
Manure, 3 maunds bonemeal in March-April.

2 acres	(*a*) 2 per hole	15th July.
	4 „	
4 acres	(*b*) 2 „	15th August.
	4 „	

(4) *Spacing.*—This experiment is to test what distance apart seedlings should be transplanted to obtain the best return and to ascertain the connection between the number of seedlings and the time of transplantation.

Manure, 3 maunds bonemeal, 1 acre each ; plough up immediately after harvest 1 acre each.

(*a*)	8 inches apart	2 seedlings	Transplant 15th July.
	12 „		
(*b*)	8 „	4 „	
	12 „		
(*c*)	8 „	2 „	Transplant 15th August.
	12 „		
(*d*)	8 „	4 „	
	12 „		

(5) Try if 1 or 2 acres cannot grow *khesari* or gram after winter rice.

2nd—*Autumn rice*—

A—Seed selection.
B—Variety experiment.
C—Manurial experiment.
D—Methods of cultivation.

A—Seed selection as per first paragraph on Larcose and Surjumukhi varieties.

B—*Varieties.*—The yielding capacity of the following varieties will be compared find out which suit the soil and locality—

Larcose
Surjamukhi
Gorfa
Puki

1 acre of each. Manure—3 maunds bonemeal. Seed rate, 1 maund per acre.
No rabi; plough and fallow.

(1)	Unmanured.	
(2)	Cowdung, 50 maunds.	
(3)	Cowdung, 50 „	per acre.
	Bonemeal, 3 „	
(4)	Bonemeal, 3 „	
(5)	Dhaincha green manure.	
(6)	Dhaincha green manure.	
	Bonemeal, 3 maunds.	
(7)	Dhaincha green manure.	
	Lime, 5 maunds; every year.	
(8)	Dhaincha green manure.	
	Lime, 5 maunds; every year.	
	Bonemeal, 3 maunds.	

Plough up immediately after harvesting; apply bonemeal, lime, cowdung in April-May; sow dhaincha in March-April and green manure in June. (2 feet high) transplant in July.

Series 2.—Residual experiment.—Experiment to ascertain the residual effects of manures.

Continue the residual experiment without manures.

(*D*) *Methods of cultivation—with variety Lohadang :—*

(1) *Time of ploughing.*—This experiment is to find out if there is any advantage from ploughing up the land immediately after harvesting the paddy crop.

Manure; bonemeal 3 maunds per acre; apply April, 2 acres each—

(*a*) Plough up immediately after harvesting.
(*b*) Plough up in April-May.

(2) *Kind of plough.*—This experiment is to test if the Meston plough is as good as the local plough in the preparation of the land for rice.

Manure, 3 maunds bonemeal; plough up immediately after harvesting; manure, March-April ; 1 acre each.

4 acres	(*a*) Local plough.
	(*b*) Meston plough.

(*c*) *Ploughing*—Larcose variety. -This experiment is to find out the most suitable plough for this soil and locality for *aus* paddy—

(*a*) Turn-wrest plough
(*b*) Local plough
(*c*) Meston plough
(*d*) Hindustan plough

} 1 acre each followed by niger.
Cowdung, 50 maunds
Bonemeal, 3 „
} per acre.

(*d*) This experiment is to test practically whether the Turn-wrest plough can replace the local plough for this soil and climate—

10 acres Turn-wrest
10 „ ordinary plough
} Followed by niger. Bonemeal 3 maunds or cowdung 50 maunds per acre.

4th—*Improvement of cattle*.—This work will be taken up on this farm with 20 selected cows and one bull with the object of improving local cattle.

5th—Selected varieties of canes will be grown for purposes of supplying a large quantity of cuttings.

ANNUAL REPORT OF THE CHINSURAH AGRICULTURAL STATION FOR THE YEAR 1913-14.

1. Introduction.

This Farm of 210 acres, the soil of which is typical of the Hooghly district of the Burdwan Division, is reserved solely for jute and rice (winter especially). During the period under report excessive early rains in May (11½ inches instead of the normal of 5·85 inches) followed by very heavy downpours in June (19·35 inches instead of the normal of 10·56 inches) caused the whole farm and district to be flooded, and destroyed the jute crop.

The season however was very favourable to winter rice, as will be gathered from the following details :—

Area.	Outturn. (1 maund=82 lbs.)	Yield per acre. (1 acre=3 bighas.)
1 acre of *nagra* ...	40⅝ mds.	40⅝ mds. or 3,331 lbs.
2 „ „ „ ...	78 „	39 „ „ 3,198 „
1 „ „ „ ...	35⅛ „	35⅛ „ „ 2,875 „
8 „ „ „ ...	289$\frac{5}{16}$ „	36⅛ „ „ 2,962 „
63¼ „ „ „ ...	1,881¼ „ ...	29¾ „ „ 2,439 „
90¾ „ all varieties ...	2,451⅓ „	27 „ „ 2,214 „

An outturn of 40⅝ maunds per acre gives us great hopes of increasing the general outturn of the Province.

Nagra, the local variety of rice, yielding large white rice, is easily the most prolific kind for this Farm ; while *dadkhani* and *badshabhog* are fine varieties that suit the district.

The questions of number of seedlings per hole and distance apart in transplanting depend entirely on the date of planting. When the operation takes place early one seedling is sufficient, and the distance apart may be wider; but when the operation is late several seedlings should be taken. It is pure waste however to employ a large number of seedlings per hole at any time. There is no necessity ever to use more than three. The extra trouble required to separate out seedlings one by one precludes the practice of employing one seedling per hole from ever becoming popular. Sowing thickly or thinly in seed-beds is not of much economical importance, because seed is cheap enough and 1 acre of seedlings suffices for transplanting 25 acres. Accordingly, while the ordinary raiyat has only 2 or 3 acres to cultivate, a few seers of seed are not worth consideration.

I am now in a position to state a few facts on rice cultivation. When ten years ago I started work on this crop I was bewildered by the complexity of the problem confronting me; and I honestly thought that the raiyat knew all what was necessary, especially as an authority like Sir George Watt in his Dictionary of Economic Products of India, page 532, paragraph 1, in addition to praising the perfect knowledge of the raiyat on rice, says: "A remarkable fact which may be here noted is that the *aus*, *aman* or *boro* rices of one district are often so different from those of another, that if interchanged, the one will not grow on the fields on which the other has flourished for centuries"; and again page 530, paragraph 1, the same authority says about varieties:

"They came from various districts of Bengal, and were readily distinguished by the local cultivators, with whom they bore distinctive names and were supposed to possess properties that rendered the one suitable for one class of soil, nay even for a particular field in the holding, while quite unsuited for another."

Now the truth is that in 1905 I imported when in charge of the Cuttack Farm fine white-grained *aus* paddy from the Central Provinces; and I obtained 18½ maunds of grain on soil that had grown until then a local coarse red-grained *aus tulsiphul* and a finer grained dirty-white *aus benibhog*—the outturn of *benibhog* being only 12½ maunds of grain per acre—under similar conditions.

Since 1905 Central Provinces *aus* has been grown with success in many parts of Bengal, and particularly in Memari, Nadia, Murshidabad and Dacca.

So much for *aus*. Now for *aman*.

From 1906 to 1909 *sukhavel* and *kamod*, two Bombay varieties, grew very well at both Dumraon and Cuttack. In both 1912 and 1913 fine *badshabhog* rice from the Budrwan Division was found to be at Rangpur as prolific as the local coarse variety *batho*. Moreover, *badshabhog* sells 10 annas dearer per maund than *batho*.

Finally, *dudkhmi* and *badshabhog*, two very fine-grained varieties, have given excellent results wherever tried throughout the Province during the last six years.

In 1913 the Damodar floods wiped out large areas of local varieties in the Burdwan district, which were satisfactorily replaced by varieties from Chinsurah.

So far as *boro* is concerned, in 1913 we supplied large quantities of seed for the Contai subdivision of Midnapore from Dacca with excellent results.

All these facts show that statements accepted as true from the raiyats by Sir George Watt do not hold good in the light of actual practice.

Out of the wilderness of different botanical characters, chemical differences of grain, complicated by different habits of growth, etc., etc., a certain goal had to be kept in view.

Besides working against prejudices, I have had to do with rice the reverse of what has been done with potatoes. Through cultivation, acclimatisation and hybridisation—but particularly cultivation—it has been possible in two centuries to produce potatoes of almost every period of growth, shape, taste and hue that will grow in almost every part of the globe. For rice, as I said before, the work was very puzzling; and I contented myself for many years by working on manures and methods of cultivation to increase the yields. If 15 maunds of clean grain per acre is the accepted average for the Province, it has been shown above conclusively that such an outturn can be improved upon (40⅔ maunds per acre). Now for varieties. There existed, as recorded by Sir G. Watt (Dictionary of Economic Products, page 529, last paragraph) over four thousands varieties in Bengal. Any one glancing at the ponderous literature on the races of rices in India (see Agricultural Ledger, 1910, No. 1, page 594) would be convinced that the last word had been said on rice. Actual practice in the field however soon showed me that all those races or varieties had been brought about through centuries of haphazard hybridisation, careless cultivation, and uncontrolled natural influences of environment. Not one of those varieties is pure. They are all to a greater or lesser extent mixed with a peculiar shaped grain which yields red rice. Now from this point work is easy. There is no need to waste time in producing new varieties, of which there are already too many. All we require is to produce a light-coloured paddy (*dhan*) yielding white rice that does not turn into a gelatinous mass when boiled. Why do I say white rice? Because such a rice only requires milling without polishing. Polishing removes the outer cover of the grain, and therewith a large precentage of proteids, which lowers the nutritive value.

A light-coloured husk is necessary, because a dark or coloured one stains the rice in the parboiling process. Parboiling is one of the processes of rice manufacture, and discolouration lowers the value for export.

A rice that turns into a gelatinous mass with partial boiling, as some of the coarse varieties do, is unsuitable, because such are dangerous to health, besides being uninviting. After careful observation over many years and after almost giving up the work as hopeless, I find that white rice is obtained yearly in every variety or race, and this can be detected simply by steeping the seed in water for 36 hours, when all red, reddish or coloured grains are immediately distinguishable through the husk having become transparent. Accordingly at sowing time steep all seed for 36 hours in water, remove all red or coloured grains, and sow the remainder immediately in the field. A man, woman, or child can select in this way 2 seers of seed per day. The cost of seed selection therefore becomes insignificant for the ordinary cultivator, as 1 acre of seedlings is sufficient for transplanting 25 to 30 acres; while the average holding in Bengal is only 4 or 5 acres, which represents a few seers of seed for each raiyat per annum. This seed selection work can be done by the most illiterate person who will never understand seed selection on botanical principles. Red grains can be detected by the eye, but only by great experience; and it is a very weary work. Red-grained rices are generally of a dirtier colour than white-grained ones in any variety, although the husk of both is light-coloured. They are rounded at the end opposite to the germ and are symmetrical. White grains in any variety have lost their symmetry, and have a bump on one side. Whenever the bump is not present remove the husk, when it will be found that the grain is red. Careless cutivation will always tend to cause the grain to revert to coarseness and redness, as wild rice is omnipresent in Bengal. On the other hand, I have found that good cultivation is an important factor towards improving varieties. At Chinsurah in 1914 the *nagra* variety after five years' good cultivation and care shows a percentage of 20 per cent. red as compared with 50 per cent. still in the local seed.

From the above and all the work done up to date, we recommend the following directions to local cultivators in order to obtain a maximum crop of rice :—

"Have the land which has been manured with 50 maunds of cowdung per acre or green-manured with *dhaincha* well prepared in June, and transplant 2 or 3 strong healthy *nagra* seedlings as early as possible in July. Then keep the crop clean and irrigate once in October and November if necessary, when a full crop should be assured."

Very useful work was done at the time of the Burdwan floods in supplying sufficient seedlings to plant 500 bighas of affected land in the Burdwan and Hoogly districts, while a large number of seedlings were procured from outside the Farm and supplied to affected parts in the Contai subdivision of Midnapore.

During the year four young men received practical training. Block A was laid out in acre blocks; a steeping pit for jute was prepared; the Overseer's quarters were improved; a well for drinking water was sunk; and the Farm was supplied with a dispensary at which a Sub-Assistant Surgeon attends regularly.

Financially the year was satisfactory. In spite of the total destruction of 40 acres of jute, receipts totalled Rs. 9,293-1-1; while expenditure, inclusive of Rs. 1,097-3-7 for capital outlay and Rs. 2,912-9-1 for supervision, came to Rs. 11,562-11-7.

2. Situation and Brief History.

The Farm is situated to the west of the East Indian Railway line between the Chinsurah and Hooghly Railway Stations. It is 38 feet above sea-level. The station was opened in 1908, and is representative of the Hooghly district.

3. Area.

The area is 202·3 acres, excluding the steading and tank on the south-west corner. Of the 202·3 acres, nearly 170 acres are under cultivation, and the remainder is occupied by roads, channels, tanks and jhils.

4. Irrigation.

The Farm has to depend almost entirely on natural rainfall. This suffices generally for jute and rice. The tank and the jhil on the eastern side supply some water for irrigation during winter, but they dry up during the hot months.

5. Character of the Soil.

With the exception of 1·35 acres of loam in the south-west corner, the soil is a clay loam and is representative of the Gangetic alluvium in the Burdwan Division. The soil is fertile and capable of growing good crops.

6. Meteorology.

Season.—The rainfall was nearly 10 inches above normal, being 16·14 inches in excess in May and June. This caused flooding, which was fatal to the jute crop but the larger rainfall was very beneficial to the paddy crop.

The following table shows the average normal rainfall at the Sadar, 3 miles off, with the actual rainfall and the number of rainy days recorded on the farm during the year under report :—

Rainfall.

	Average normal rainfall at Sadar.	Actual rainfall.	Actual number of rainy days.
1913.			
April	2·46	1·40	2
May	5·85	11·48	10
June	10·56	19·35	19
July	11·28	11·47	21
August	11·64	10·88	15
September	8·40	8·09	8
October	4·09	3·20	5
November	0·66	1·00	1
December	0·19	.....	.....
1914.			
January	0·38	.....	.....
February	1·20	2·06	3
March	1·58	.....	.....
Total ...	58·29	68·93	84

7. Temperature.

The following table shows the average monthly maximum and minimum temperatures in Fahrenheit, in the open and in the shade, on this Farm for the year, the highest temperature recorded being 112° in shade and 126° in godown in the months of April and May, and the lowest—47°—in the month of December:—

Temperature.

	Average maximum outside.	Average minimum outside.	Average maximum inside.	Average minimum inside.
1913.				
April ...	104	80	91	82
May ...	95	88	87	81
June ...	94	63	82	80
July ...	93	81	86	78
August ...	93	80	85	83
September ...	95	81	88	82
October ...	98	75	97	78
November ...	86	63	76	68
December ...	82	51	72	62
1914.				
January ...	82	57	71	62
February ...	90	66	78	76
March ...	97	67	86	74

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8. Operations during the year.

A.—General Crops grown.

The table below shows the area, actual outturn, and yield per acre of crops grown during 1913-14:—

Crop.	Area in acres.	Actua outturn in maunds.	Yield per acre in maunds.	Remarks.
Aman paddy	90·74	245$\frac{1}{5}$	27	In addition to the 90·74 acres there were 14·65 acres of seed-beds. Crop very good.
Jute sown on (harvested 3·15).	41 92	1·81 – 24$\frac{1}{4}$ (1·34)—9$\frac{9}{10}$	Fibre 13$\frac{3}{8}$ Seed 7$\frac{2}{5}$	The abnormal rains of May and June destroyed the crop, except a small area on high land.

The average outturn of 27 maunds of paddy from 90$\frac{3}{4}$ acres in 1913 compares very well with 21$\frac{4}{5}$ maunds from 102 acres in 1912 and 16$\frac{1}{4}$ maunds from 58 acres in 1911.

The following table shows the respective outturn of different varieties of winter rice. An average outturn of 29$\frac{3}{4}$ maunds of grain per acre from 63$\frac{1}{4}$ acres of the *nagra*

variety fully corroborates the results of previous years as to the superiority of the local *aman* paddy.

Variety.	Area in acres.	Average outturn per acre.
Nagra	63·24	29¾
Banktulsi...	16	23
Baashabhog	1·8	20⅜
Daakhani...	6·4	18⅜

The statement below shews the highest outturns obtained on acre plots and on larger areas:—

Plot No.	Variety.	Area in acres.	Outturn per acre.
Block A $\frac{15-19}{B}$	*Nagra*	1	40⅝
„ $\frac{9-13}{C}$	„	1	35⅛
„ $\frac{9-13}{B}$	„	1	34⅞
„ $\frac{3-7}{C}$	„	1	34¼
„ $\frac{21-25}{B}$	„	1	34
„ $\frac{3-7}{B}$	„	1	32½
Block D, F line	„	2	39
„ A line	*Dadkhani*	4	19¾

B.—Experimental Work on Winter Rice—Aman Dhan (Oryz-Sativa).

(*a*) Manurial—

(1) General Manures.
(2) Residues.
(3) Special Manures—Sulphate of Ammonia.
(4) Green Manures.

(*b*) Varietal.

(*c*) Methods of Cultivation—

(1) Number of Seedlings.
(2) Date of Planting.
(3) Distance apart in Planting.

(1) General Manures—Object—To find out the most economical manure for rice on this land.

The following table gives the manures, quantities, and outturns of grain and straw per acre in 1913-14:—

	Manure per acre.	Cost of manure per acre.	Outturn per acre.	
			Grain.	Straw.
		Rs.	Mds. lbs.	Mds. lbs.
1	Unmanured ...	.....	$24\frac{1}{4}$ = 1,988½	$32\frac{1}{2}$ = 2,665
2	Cowdung 50 maunds ...	3	$29\frac{7}{8}$ = 2,450	$40\frac{1}{4}$ = 3,300½
3	„ 100 „ ...	6	$32\frac{2}{8}$ = 2,675	$43\frac{7}{8}$ = 3,598
		Rs.		
4	„ 50 „ 3 Super 4 „ 9 Saltpetre 1 „ 9	21	$33\frac{1}{4}$ = 2,726½	$41\frac{2}{8}$ = 3,413
5	Bonemeal 3 „ ... Saltpetre 1 „ ...	18	$31\frac{1}{4}$ = 2,562	33 = 2,706
6	*Dhaincha* green-manured	1	$29\frac{3}{8}$ = 2,409	$34\frac{1}{2}$ = 2,829
7	*Sunn* hemp „	1	$28\frac{7}{8}$ = 2,368	$35\frac{1}{2}$ = 2,911
8	Nitrolim 2 maunds...	18	$33\frac{2}{8}$ = 2,757	38 = 3,116
9	Castor-cake 5 „	15	$33\frac{3}{4}$ = 2,767	$40\frac{3}{8}$ = 3,310
10	Unmanured ...	.....	$23\frac{3}{4}$ = 1,941½	$28\frac{3}{8}$ = 2,327

From these figures, calculating grain at Rs. 3 and straw at annas 8 per maund, cowdung, *dhaincha* green-manured, and *sunn* hemp green-manured are the most economical manures for this soil: still all applications give a profit, and the record is an interesting one.

With the above figures it is necessary to compare the results of previous years which are given in the following table. The figures are the average of two plots in each case.

Serial No.	Manure per acre.	Average outturn per acre in maunds									
		1909-10		1910-11.		1911-12.		1912-13.		1913-14.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
1	Unmanured	$27\frac{1}{8}$	36	$13\frac{3}{4}$	21	$13\frac{3}{4}$	$19\frac{7}{8}$	$21\frac{1}{4}$	$29\frac{2}{8}$	$24\frac{1}{4}$	$32\frac{1}{2}$
2	Cowdung 50 maunds ...	$28\frac{1}{4}$	$38\frac{3}{4}$	$18\frac{1}{4}$	$21\frac{1}{2}$	$23\frac{5}{8}$	$35\frac{1}{4}$	$24\frac{7}{8}$	33	$29\frac{7}{8}$	$40\frac{1}{4}$
3	„ 100 „ ...	$31\frac{3}{8}$	$47\frac{7}{8}$	18	$20\frac{1}{2}$	$18\frac{1}{8}$	$2\cdot\frac{1}{4}$	$23\frac{1}{10}$	$37\frac{1}{2}$	$32\frac{5}{8}$	$43\frac{7}{8}$
4	„ 50 „ ... Super 3 „ ... Saltpetre 1 „ ..	33	$52\frac{1}{8}$	$18\frac{1}{8}$	$23\frac{3}{4}$	$22\frac{1}{4}$	33	$25\frac{1}{7}$	$38\frac{1}{2}$	$33\frac{1}{4}$	$41\frac{5}{8}$
5	Bonemeal 3 „ ... Saltpetre 1 „ ...	$30\frac{1}{4}$	50	$17\frac{1}{4}$	$26\frac{1}{8}$	$18\frac{3}{4}$	$42\frac{3}{8}$	$25\frac{1}{3}$	$34\frac{5}{8}$	$31\frac{1}{4}$	33
6	*Dhaincha* green-manured...	$26\frac{1}{4}$	$34\frac{1}{8}$	$21\frac{1}{5}$	$26\frac{1}{8}$	$16\frac{5}{8}$	23	$29\frac{1}{7}$	$46\frac{1}{2}$	$29\frac{3}{8}$	$34\frac{1}{2}$
7	*Sunn* hemp „ ...	$24\frac{1}{8}$	$30\frac{1}{2}$	27	30	$16\frac{1}{8}$	$23\frac{1}{8}$	$29\frac{1}{2}$	$38\frac{3}{8}$	$28\frac{7}{8}$	$35\frac{1}{2}$
8	Nitrolim 2 maunds ...	...		...	...	...	..	$27\frac{3}{4}$	$37\frac{1}{4}$	$33\frac{5}{8}$	38
9	Castor-cake 5 „ ...	...	...	...	...	...	...	$24\frac{7}{10}$	34	$33\frac{3}{4}$	$40\frac{3}{8}$
11	Unmanured	30	$42\frac{1}{2}$	$1\cdot\frac{1}{4}$	$16\frac{1}{8}$	19	$28\frac{1}{2}$	$22\frac{3}{4}$	$30\frac{1}{4}$	$23\frac{3}{8}$	$28\frac{3}{8}$

Dates of transplanting—

1913—July 27th.
1912—July 14th.
1911—July 14th.
1910—August 30th.
1909—July 27th.

In this table the outstanding feature is the irregularity of the outturns of one year as compared with another year. For example, from the unmanured plot in 1909, 27⅛ maunds of grain were obtained, while in 1911 only 13¾ were harvested; in 1912, 21¼ maunds resulted, while in 1910 only 13¾ maunds are shown, and in 1913 the outturn was 24¼ maunds.

Again in 1913 the outturn from the unmanured plot was greater than any of the manured plots in 1911, while the unmanured plots of 1912 were greater than any of the treated plots in 1910 with the exception of the *sunn* hemp plot. This leads one to believe that there is a factor of greater importance in rice cultivation than manure. What is it? A study of the following table of rainfalls for the years under consideration throws some light on this point:—

	1909.	1910.	1911.	1912.	1913.	Normal of 40 years.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
June	15·72	6·11	12·12	5·45	19·35	10·56
July	5·24	7·42	8·18	12·34	11·47	11 28
August	17·36	9·82	6·76	7 28	10·88	11·64
September	5·61	7·88	4·20	6·25	8·09	8·40
October	5·26	8·01	2·54	6·18	3·20	4·09
Total ...	49·19	39·24	33·80	37·50	52·99	45·97
Normal for whole year...	...	...	...	...	...	54·29

In the years 1910 and 1911, when the outturns were much lower than in 1909, 1912 or 1913, the rainfall was much more favourable in these latter years. From necessity transplanting was very late in 1910, while in 1911 the rainfall was very scanty at the flowering season. In the former case we had a shorter growing period, while in the latter we had less thorough pollination, both causes lowering the final outturn of the crop.

These two factors, viz. time of planting and pollination, which may be termed the seasonal factors, are very important in rice cultivation. Given plenty of rain in June and July, *i.e.*, normal rainfall, to allow of transplanting by the middle of July, and a good supply of rain in September and October to allow of full growth at time of pollination, a much larger crop will be harvested without any manurial application whatsoever than from a crop with full manures that is grown in a season where transplanting is late and pollination and growth are adversely affected by scarcity of rain in September and October. From the average outturns of the past five years given below it is clear that manures increase the outturn in each case, and that 50 maunds cowdung per acre or green-manuring with *Dhaincha* or *sunn* hemp are the most economical manures for rice on this land. There is no economical advantage in increasing the amount of cowdung per acre or in adding artificial manures.

		Grain.	Straw
		Mds.	Mds.
1	Unmanured	20¾	28½
2	Cowdung 50 maunds	25	33¾
3	„ 100 „	24¾	35
4	„ 50 „ ... ... Super 3 „ ... ... Saltpetre 1 „	26½	38
5	Bonemeal 3 „ ... ... Saltpetre 1 „	24½	37¼
6	*Dhaincha* green-manured ...	24½	33
7	*Sunn* hemp „	25¼	31½

(2) Manurial Residues.—Object—To find out if manures have any effect in the future after one application.

The following table shows the manurial residues left on acre plots from applications of 1912:—

Serial No.	Manure applied in 1912-13.	Outturn in 1913-14 in maunds.		Outturn in 1912-13 in maunds when manure was applied.	
		Grain.	Straw.	Grain.	Straw.
1	Unmanured	18	24	$27\frac{3}{8}$	$32\frac{1}{4}$
2	Cowdung 200 maunds ...	25	30	33	$43\frac{1}{3}$
3	*Dhaincha* green-manured	27	32	$31\frac{7}{8}$	$41\frac{1}{8}$
4	*Sunn* hemp „ ...	22	23	$30\frac{1}{2}$	$42\frac{7}{8}$
5	Netrolim 2 maunds ...	25	31	$28\frac{3}{4}$	$30\frac{1}{2}$

These figures corroborate the superiority of *dhaincha* as a green-manuring crop for *aman* paddy. The other figures are interesting.

(3) *Sulphate of Ammonia Manurial Series.*—Object—To find out the value of sulphate of ammonia as a manure for rice on this land.

The following table shows the results:—

Serial No.	Manures per acre.	Outturn per acre in maunds.	
		Grain.	Straw.
1	Unmanured	$34\frac{1}{4}$	53
2	Sulphate of ammonia 1 maund	$36\frac{3}{4}$	$53\frac{1}{2}$
3	„ „ 2 maunds	$33\frac{1}{8}$	$65\frac{3}{4}$
4	Basic slag „ ...	$35\frac{1}{8}$	$55\frac{1}{2}$
5	Sulphate of ammonia 1 maund Basic slag 3 maunds	$37\frac{1}{2}$	$60\frac{3}{4}$
6	Sulphate of ammonia 2 „ Basic slag 3 „	$35\frac{3}{4}$	$67\frac{1}{4}$

The very heavy yield from the unmanured plot prevents any of the applications being economical: still 1 maund of sulphate of ammonia is a promising application.

(4) *Dhaincha* compared with cowdung on acre blocks.

	Outturn in 1913.	
	Grain.	Straw.
	Mds.	Mds.
Dhaincha green-manured	$32\frac{1}{2}$	$42\frac{1}{2}$
Cowdung 100 maunds	$34\frac{1}{4}$	$44\frac{3}{4}$

The *dhaincha* crop would have been better had the rains been more seasonable. Seed rate for *dhaincha* is 6 seers; seed time is May after ploughing twice.

(*b*) *Varietal*—Object—To find out the most economical variety for this Farm.

The table below shows the results with five different varieties of paddy for the last five years:—

Serial No.	Name of variety.	Outturn per acre in maunds.									
		Average, 1909-10.		Average, 1910-11.		Average, 1911-12.		Average, 1912-13.		Average, 1913-14.	
		Grain	Straw.	Grain.	Straw.	Grain.	Straw	Grain.	Straw.	Grain.	Straw.
1	*Dadkhani* ...	$19\frac{3}{4}$	24	$9\frac{5}{8}$	$16\frac{1}{4}$	$17\frac{1}{8}$	$25\frac{3}{4}$	$18\frac{1}{2}$	$23\frac{1}{8}$	$26\frac{1}{4}$	30
2	*Badshabhog* ...	$20\frac{1}{8}$	35	$12\frac{1}{2}$	$17\frac{1}{2}$	$20\frac{3}{4}$	37	$16\frac{7}{8}$	$26\frac{3}{4}$	$28\frac{1}{4}$	$47\frac{7}{8}$
3	*Banktulshi* ...	$18\frac{1}{8}$	$29\frac{1}{2}$	$9\frac{1}{4}$	$15\frac{5}{8}$	$18\frac{1}{4}$	$31\frac{1}{4}$	$21\frac{2}{3}$	$31\frac{3}{4}$	$25\frac{7}{8}$	$43\frac{3}{4}$
4	*Hatishal*	19	$26\frac{5}{8}$	$10\frac{3}{4}$	$16\frac{7}{8}$	$12\frac{7}{8}$	36	22	$36\frac{5}{8}$	$23\frac{7}{8}$	$39\frac{1}{4}$
5	*Nagra* ...	$29\frac{1}{8}$	$32\frac{1}{8}$	9	$16\frac{1}{8}$	$19\frac{1}{2}$	$29\frac{3}{4}$	$21\frac{1}{2}$	$34\frac{3}{8}$	$31\frac{1}{4}$	$34\frac{1}{8}$

Nagra yields the largest weight without any great care.

Badshabhog—a fine and scented variety, selling at 4 annas higher per maund than *nagra*, the local variety—is a prolific variety and gives a good result financially.

Dadkhani and *banktulsi*, which are fine-grained and better priced than *nagra*, are also paying varieties.

Examination, May 1914—

Hatishal ...	Fine *dhan*, yields white rice	...	Seed is pure.	In future seed selection will be restricted to *nagra*, *badshabhog*, and *dadkhani*.
Badshabhog	Ditto,	ditto	...	Ditto.
Dadkhani ...	Ditto,	ditto	...	Seed contains 2 per cent. red grains
Banktulsi ...	Medium *dhan*,	ditto	...	Seed contains 50 per cent red grains
Nagra ...	Ditto,	ditto	...	Seed contains 17 per cent. red grains.

(*c*) (1) *Seedling Experiment.*—Object—To find out what number of seedlings per hole 10 inches apart gives the higest yield.

The transplanting of one, two, and three seedlings per hole 10 inches apart was compared during the last five years. It has been observed that one seedling gives the best results only when transplanting is done early in July, as may appear from the table under transplanting in different weeks. The conflicting results in certain years are accounted for by the fact that transplanting was late in those years.

The following table shows the average results during the period :—

Number of seedlings per hole.	Average outturn per acre in maunds, 1909-10.		Outturn per acre in maunds, 1910-11		Average outturn per acre in maunds.					
					1911-12.		1912-13.		1913-14.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
1	31⅜	33¾	8½	9¼	19	39	20½	21¼	23	39⅞
2	25½	31¾	12	14½	16	31⅛	22	27⅕	24¾	20
3	24½	28¾	13⅞	16¼	17⅛	36⅛	30⅜	38½	30	39⅛

One seedling and three or four seedlings were compared on acre blocks in 1912-13 with the following result :—

	Grain in maunds.	Straw in maunds.
1 seedling ...	34	45¼
3 or 4 seedlings ...	27½	29½

(2) Seedlings: Date of Transplanting.—Object—To determine the latest date for the transplanting of one seedling per hole to be successful an experiment was started in the previous year (1912-13), and the results shown below are striking and explain the unsuitability of the one seedling method after the close of July :—

Year.	Produce.	Outturn per acre (in maunds) of one seedling transplanted 10 inches apart in—						
		First week of July	Second week of July.	Third week of July.	Fourth week of July.	First week of August.	Second week of August.	Third week of August.
1912-13 ...	Grain	32¼	27¾	22⅖	24½	21¾	18⅜	17¾
	Straw	34	32	27	26	23⅛	21¾	18¾
1913-14 ...	Grain	36½	30	29½	30½	25	16	14⅓
	Straw	47¾	36½	39¾	35½	29½	18¾	17⅜

(3) Spacing Experiment.—Object—To find out what is the best distance apart to transplant rice.

The results in 1909-10 and 1911-12 went to show that one seedling 10 inches apart gave the best outturn. In 1912-13 three spacings—6 inches, 12 inches, and 14 inches—with one seedling per hole were tried with about equal results. So in the year under report three spacings—10 inches, 14 inches, and 18 inches—were experimented with, and the number of seedlings per hole increased proportionately in the cases of the longer spacings.

The tables below show the average results from duplicate plots:—

1913-14.

Serial No.	Spacing.	Number of seedlings per hole.	Outturn per acre in maunds. Grain.	Straw.
	Inches.			
1	10	1	26⅜	32¼
2	14	2	23	25⅛
3	18	3	23⅛	25¼

Thus a spacing of 10 inches, with one seedling per hole, is the best distance apart in years of normal transplanting.

C.—Distribution of Seed.

The Farm did good work in the year under report by supplying paddy seedlings very timely to the flood-affected areas in the districts of Burdwan and Hooghly, as well as to Contai in Midnapore. Seedlings from a seed-bed area of 7 acres, sufficient to transplant 500 bighas of land, were carefully packed and despatched by train.

Besides, the following seeds were distributed from the Farm store during the period under report:—

	Maunds.
Barapat jute seed	6½
Red *deshi* jute	½
Dhaincha	7½
Central Provinces fine-grained *aus* paddy	3¼
Dakhani paddy	12
Badshabhog „	7½
Hatishal „	9½
Samudrabali „	6¼
Banktulsi „	8
Nagra „	2
Sonamung „	2

D.—Practical Training of Young Men.

Four young men received practical training during the year. It is to be regretted that there is a tendency of the young men to shirk practical work.

9. Receipts and Expenditure.

The financial condition of the Farm during the year ending 31st March 1914 is summarized below:—

	Rs.	A.	P.
Receipts—Sale proceeds	9,293	1	1
Expenditure (detailed below)	11,562	11	7

	Rs.	A.	P.
Ordinary Farm expenditure	7,168	7	5
Cattle food	384	7	6
Supervising establishment	2,912	9	1
Capital outlay	1,097	3	7
Total ...	11,562	11	7

With a good jute crop receipts will be much larger. Everything considered, the financial aspect of the year reflects great credit on the Farm workers.

It may be noted here that this is an agricultural station involving the entertainment of a heavy establishment for supervision alone, costing Rs. 3,000 a year, while many experiments are carried out.

10. Visitors.

A few landed gentlemen and raiyats visited the Farm during the year.

11. Management and Inspection.

Babu Tara Nath Roy, the permanent Superintendent, was taken to the Dacca Farm early in the year, and Babu Chuni Lal Mustafi, Agricultural Inspector of the Burdwan Division, held charge of the Farm from May, *i.e.*, during practically the whole of the period under report.

The Director of Agriculture, Bengal, inspected the station twice during the year, and the Deputy Director of Agriculture, Bengal, made frequent inspections.

F. Smith,

Deputy Director of Agriculture, Bengal.

EXPERIMENTAL SCHEME FOR THE CHINSURA FARM FOR THE YEAR 1914-15.

1st—Winter Rice.—*A*—Seed selection.

B—Variety experiment.

C—Manurial.

D—Methods of cultivation experiment.

A—Seed Selection.—Varietal selection as in previous years will be continued during 1914-15.

Intravarietal selection will be commenced on the following varieties, *viz.*—

Nagra. Dadkhani.

In 1914, 100 single (best) plants of each variety will be selected by eye. Each one will be marked by a tape and at harvest time each plant will be harvested separately and the seed kept separate till the sowing period in 1915.

B—Varieties ½ acre each.—Carry out in duplicate.

The following varieties of rice will be compared to find out which can be recommended for the Hooghly district :—

(1) Nagra
(2) Banktulsi
(3) Kataribhog
(4) Badshabhog
(5) Dadkhani
(6) Indursail

} Manure—cowdung, 50 maunds per acre.

Plough up immediately after harvesting; apply cowdung in March-April; transplant in July.

C.—Manures.—Nagra variety, $\frac{1}{5}$th acre each—carry out on 3 plots.

The following manurial applications will be compared to find out which is the most economical for the Hooghly district :—

(1) Unmanured.
(2) Cowdung, 100 maunds.
(3) „ and bonemeal, 3 maunds.
(4) „ and ammonia sulphate, 1 maund.
(5) „ and bonemeal, 3 maunds, and ammonia sulphate, 1 maund.
(6) Bonemeal and ammonia sulphate.
(7) „ alone, 3 maunds.

D.—Methods of cultivation—Variety, Nagra.

(1) *Time of ploughing.*—This experiment is to find out if there is any advantage from ploughing the land immediately after harvesting the crop—

(*a*) Plough up immediately after harvesting.
(*b*) Plough up in April-May.

Manure—cowdung, 50 maunds per acre. Apply April, 2 acres each.

(2) *Kind of plough.*—This experiment is to test whether the local plough can be economically replaced by the Hindustan plough in the Hooghly district.

(*a*) Local plough.
(*b*) Hindustan plough.

Manure, 8 maunds bonemeal; plough up immediately after harvesting; manure March-April; 1 acre each.

(3) *Seedlings.*—¼ acre each.—This experiment is to find out what number of seedlings per hole is the most economical for transplanting in the middle of July or the middle of August.

Plough up immediately after harvest.

Manure, 50 maunds cowdung, March-April—

(*a*)	2 per hole 4 „	15th July.
(*b*)	2 per hole 4 „	15th August.

(4) *Spacing*—Variety Nagra.—This experiment is to find out whether seedlings should be transplanted 8 inches apart or 12 inches apart when transplanting takes place in the middle of July or middle of August.

Plough up immediately after harvest 1 acre each.

Manure, 50 maunds cowdung per acre.

(*a*)	8 inches apart 12 „	2 seedlings	Transplant 15th July.
(*b*)	8 „ 12 „	4 „	
(*c*)	8 „ 12 „	2 „	Transplant 15th August.
(*d*)	8 „ 12 „	4 „	

(5) Try if 1 or 2 acres cannot grow *khesari* or gram after winter rice.

This experiment is to test whether a rabi crop can be grown after winter rice in this soil and district.

3rd—Jute—A—Seed selection.

B—Manurial experiment on local jute (Red Olitorious).

Series 1.—Manures.—This experiment is to find out an economical manurial application for jute for this soil and district—

(1)	Unmanured	⅕th acre each. Carry out five times.
(2)	100 maunds cowdung per acre	
(3)	10 „ castor cake „	
(4)	50 „ cowdung „ 3 „ super 1 „ salpetre	
(5)	Unmanured	

Series 2.—This experiment is to test if cowdung can be economically replaced by artificial manure—

(1)	Unmanured	⅕th acre each. Carry out in duplicate Red Deshi.
(2)	200 lbs muriate of potash per acre 200 lbs. super 100 lbs. sulphate of ammonia	
(3)	200 lbs. super 100 lbs. sulphate of ammonia	
(4)	200 lbs. muriate of potash	
(5)	200 lbs. „ 200 lbs. super 100 maunds cowdung	

Series 3.—This experiment is to test if half the quantities of manure applied in series 2 would not be just as economical—

(1)	Unmanured.	⅕th acre each. Carry out in duplicate Red Deshi.
(2)	100 lbs. muriate of potash ... 100 lbs. super 50 lbs. sulphate of ammonia	
(3)	100 lbs. super 50 lbs. sulphate of ammonia.	
(4)	100 lbs. muriate of potash	
(5)	100 lbs. cowdung 100 lbs. muriate of potash 100 lbs super. 50 lbs. sulphate of ammonia	

C—Varieties.—This is to test what variety of jute best suits the soil of the Hooghly district—

(1)	Local red	1 acre each. 200 mds. cow-dung per acre.
(2)	Deswal	
(3)	Kakya Bombai	
(4)	Dhaleswar (from Dacca)	
(5)	Tosha (Pabna)	

ANNUAL REPORT OF THE RAJSHAHI AGRICULTURAL STATION FOR THE YEAR 1913-14.

1. Introduction.

The most important work at this station in 1913-14 was the production of jute seed, and as a result 37 maunds were obtained for distribution. Besides, attention was paid to other crops, chief of which was sugarcane and potatoes. Sugarcane was only fair, while potatoes were injured by cut worms. From sugarcane 80 maunds of *gur* per acre were obtained from ¼ acre plots, while the average for 3½ acres was only 41 maunds per acre; and from winter rice the outturn for experimental plots was 20¾ maunds per acre from 1⅘ acres, while the outturn from 12½ acres was only 12 maunds per acre.

A pucka well and poultry shed were constructed during the year.

One apprentice received practical training; and the Farm distributed 35 maunds jute seed, 8 maunds cowpeas, 27 maunds oats, 8,000 cane cuttings and some bonemeal.

Receipts in April—March 1913-14 were Rs. 2,942-7-6; while expenditure was Rs. 7,802-1-6 inclusive of Rs. 2,364-11-6 for establishment and Rs. 1,055-7-6 for capital outlay.

2. Situation and Brief History.

This Farm is situated in Rampur Boalia town, the headquarters of the Rajshahi district. The station was opened in November 1904.

3. Area.

The area of the station is 63 acres, of which 50 acres are available for cultivation, the remainder being occupied by buildings, roads, tanks and drains.

Of this 50 acres, one-quarter of the area is suited to winter paddy, the remainder being suitable for jute, *aus* paddy, sugarcane, *sunn*, *juar* and *rabi* crops.

4. Irrigation.

There is no irrigation on this Farm. The crops depend entirely on the natural rainfall.

5. Character of the Soil.

The soil of this Farm is a marl, poor in organic matter, in phosphoric acid, and potash.

6. Meteorology.

The following table shows the actual rainfall and number of rainy days recorded on the Farm in 1913-14, as well as the normal rainfall and the normal number of rainy days in Rampur Boalia :—

	Actual Rainfall, 1913-14.		Normal, 1913-14.	
	Amount.	Number of days.	Rainfall.	Number of rainy days.
1913.	Inches.		Inches.	
April	.....	.....	1·84	3·0
May	8·27	9	5·64	7·7
June	9·9	13	10·07	12·4
July	9·16	18	10·79	15·1
August	12·14	16	10·42	14·6
September	7 35	11	10·05	12·1
October	8·65	2	4·14	4·6
November	.....	.....	0·38	0·7
December	1·62	1	0·06	0·3
1914.				
January	... ...	.....	0·36	0·9
February	·89	3	0·75	1·5
March	·82	1	1·12	1·9
	58·80	74	55·62	74·8

The season was favourable for all crops.

7. Operations during the year.

A.—General Crops.

The following table gives details :—

Crop.	Area in acres.	Total outturn.	Yield per acre.
		Mds.	Mds.
Jute	14	.....	.....
	4⅗	Ploughed up	.....
	7	{ 37 seed { 15½ fibre	5⅖ 2¼
	2⅖	13 „	5
Aus paddy	8 3/10	164	20
Aman paddy ...	12⅕	150	12
Aman paddy (experimental).	1⅘	37¾	20¾
Sugarcane (newly planted)	3⅗	147½	41
Ratooned	1	17	17
Rabi.			
Oats	5⅜	71¾	12⅘
Gram	10⅘	71	6½
Khesari	10	68¼	6⅘
Potatoes	3⅘	132	34¾

Aus paddy did well; *aman* paddy was poor; sugarcane was only fair; oats, gram and *khesari* were only fair, while potatoes were bad. Out of a possible 50 acres, only 34 grew fair crops in *kharif* and *agahani* seasons. In the *rabi* season the land was fully occupied, although crops were poor to fair.

B.—Experimental Work.

The only figures of interest under this head are—

1st—Winter Rice—Manurial.

2nd—Sugarcane—Variety.

Winter Rice.—The following table gives details of a manurial experiment on this crop, and shows that an advantage is obtained by an application of cowdung or by green-manuring :—

Statement of Soil Paddy grown on the Rajshahi Farm in the year 1913-1914.

No. of plot.	Name of crop.	Area in acres.	Nature of experiment and manure per acre.	Yield per plot.		Yield per acre.	
				Grain.	Straw.	Grain.	Straw.
			Manurial Experiment.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.
35	Elai paddy ...	½	No manure	2 18 4	4 9 4	12 11 4	21 6 4
39	Ditto ...	½	Ditto	4 16 8	10 12 12	22 2 8	51 23 12
43	Ditto ...	½	Ditto	4 2 0	9 1 8	20 10 0	45 7 8
		1½	.....	10 36 12	23 23 8	54 23 12	117 37 8
	Average per plot	...	.....	3 25 9	7 34 8	18 14 0	39 12 8
36	Elai paddy ...	½	100 maunds cowdung per acre.	3 39 8	7 32 8	19 37 8	39 2 8
40	Ditto ...	½	Ditto	5 14 0	13 17 2	26 30 0	67 8 12
44	Ditto ...	½	Ditto	3 21 0	7 6 0	17 25 0	35 30 0
		1½	.....	12 34 8	28 15 10	64 12 8	142 1 4
	Average per plot	...	...	4 11 8	9 18 8	21 17 8	47 13 12
37	Elai paddy ...	½	30 seers *dhaincha* per acre ...	4 22 0	9 25 12	22 30 0	48 8 12
41	Ditto ...	½	Ditto	5 16 8	14 18 5	26 2 8	72 11 9
45	Ditto ...	½	Ditto	4 1 4	9 9 12	20 6 4	46 8 12
		1½	.....	13 39 12	33 13 13	68 38 12	166 29 1
	Average per plot	...	.....	4 26 9	11 4 9	22¾ 39 9	55 23 9

Sugarcane.—A variety test was made on this crop with the following results :—

Statement of Sugarcane of Experimental Plots grown on the Rajshahi Farm in the year 1913.

No. of plot.	Name of cane.	Area in acres.	Nature of experiment.	Yield per plot.			Yield per acre.		
				Weight of cane.	Weight of juice.	Weight of *gur*.	Weight of cane.	Weight of juice.	Weight of *gur*.
			Variety Experiment.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch.	Mds. s. ch
4	*Khari* cane ...	1/10	300 maunds cowdung per acre.	76 6 7	48 20 5	6 6 0	761 24 6	485 3 2	61 20 0
7	Ditto ...	1/10	Ditto ...	100 25 13	61 16 2	7 32 9	1,006 18 2	614 1 4	78 5 10
	Average of duplicates.	...	.....	176 32 4	109 36 7	13 38 9	1,768 2 8	1,099 4 6	139 25 10
4	*Gandheri* ...	1/10	300 maunds cowdung per acre.	73 0 12	47 35 13	8 26 8	730 7 8	478 38 2	86 21 14
7	Ditto ...	1/10	Ditto ...	64 1 6	44 24 7	8 1 5	640 13 12	446 4 6	80 13 2
	Average of duplicates.	...	.....	137 2 2	92 20 4	16 27 8	1,370 21 4	925 2 8	166 35 0
5	*Samsara* ...	1/10	300 maunds cowdung per acre.	85 35 4	65 28 11	9 0 11	858 32 8	657 6 14	90 6 14
6	Ditto ...	1/10	Ditto ...	68 6 7	49 16 5	6 39 6	681 24 6	494 3 2	69 33 12
	Average of duplicates.	...	.....	154 1 11	115 5 0	16 0 1	1,540 16 14	1,151 10 0	160 0 10
5	*Velnamukhi*	1/10	300 maunds cowdung per acre.	70 7 9	47 32 15	8 7 7	701 35 10	478 9 6	81 34 6
6	Ditto ...	1/10	Ditto ...	69 23 6	49 7 3	8 21 5	695 33 12	491 31 14	85 13 2
	Average of duplicates.	...	.....	139 30 15	97 0 2	16 28 12	1,397 29 6	970 1 4	6 7 8

C.—Distribution of Seed.

The following table shows the amount of seed distributed from this Farm during 1913-14:—

Jute seed	Maunds	35
Cowpeas	„	8
Oats	„	27
Sugarcane cuttings	Pieces	8,000

D.—Practical Training of Young Men.

During the year one young man received practical training at this Farm.

8. Receipts and Expenditure.

During the year ending 31st March 1914 the following receipts were obtained at this Farm: Rs. 2,511-2-6 for sale proceeds and Rs. 431 worth of seeds supplied to seed store, *i.e.*, altogether Rs. 2,942-2-6; while the following expenditure was incurred:—

	Rs.	A.	P.
Establishment	2,364	11	6
Labour and general expenses	3,828	3	9
Cattle food	553	10	9
Capital outlay	1,055	7	6
Total ...	7,802	1	6

This compares with receipts Rs. 3,395-12-9, and expenditure Rs. 10,232-1, inclusive of establishment Rs. 2,130 and capital outlay of Rs. 4,347 in 1912-13.

9. Management.

Babu Hara Kumar Guha was in charge of the Farm until the end of January 1914, when Babu K. D. Ray took charge.

During this period Mr. Smith inspected the Farm frequently, and the Director of Agriculture inspected it several times.

F. Smith,

Deputy Director of Agriculture, Bengal.

EXPERIMENTAL SCHEME FOR THE RAJSHAHI FARM FOR 1914-15.

1st.—Seed selection—Intervarietal selection of seed with the primary object of improving yield and keeping up a supply of seed will be carried out on jute and rice.

2nd.—Sugarcane—A—Varieties—The object of this experiment is to find out which varieties are most suitable to the soil and climate of Rajshahi—

(1) Gandheri
(2) Vendamukhi
(3) Shamshara
(4) Khari
(5) B. 147
(6) Stripped Tanna
(7) Yellow Tanna.

} $\frac{1}{10}$th acre plots in triplicate, manure cowdung 200 mds., castor cake 8 mds.

B.—Manure—The aim of this experiment is to find in these applications the most economical for this soil.

Shamshara variety — ½ acre plots in duplicate.

(1) 200 mds. cowdung
(2) 200 mds. do.
(3) 8 mds. castor cake
} in two dressings.

(4) 100 mds. cowdung
3 mds. super
2 mds. sulphate of potash
2 mds. sulphate of ammonia
} in two dressings.

C—Methods of cultivation—This experiment is to test the efficacy of the local method of cultivation against the ridge and furrow system.—

(1)	On plough furrow	1 acre each.
(2)	Ridge and furrow system	
	Vendamukhi cane	Manure 200 mds. cowdung, 8 mds. castor cake per acre.

Rattoon this year's crop.
A large supply of cane will be produced for distribution.

3rd. Potatoes—(1) Storing.
(2) Varieties.
(3) Manures.

1. *Storing.*—The aim of this experiment is to test if potatoes can be stored economically in Rajshahi—

Take 10 maunds Nainital.
10 „ Italian.
10 „ Australian.

Store on machans in sand in a kutcha thatched hut till October. Constant watch will have to be kept and hand picking twice and thrice a week will be necessary.

2. *Varieties.*—This experiment is to see which variety suits best the soil and locality—

(1)	Darjeeling	1 acre each, manure 20 maunds castor cake.
(2)	Nainital	
(3)	Italian	

3. *Manures.*—One-half acre each. The object of this experiment is to find which of the following applications is the most economical—

Italian—

(1)	Castor cake 20 maunds.	
(2)	Cowdung 200 "	Per acre.
	Super 2 maunds (40 per cent. solution)	
	Sulphate of ammonia 1 maund ...	
	Sulphate of potash 1 maund ...	
(3)	Cowdung 200 maunds	Per acre.
	Super 2 maunds	
	Nitrate of soda 1 maund ...	
	Sulphate of potash 1 maund ...	

4. *Jute.*—Seed supply of superior seed for distribution with the primary object of improving yield.

ANNUAL REPORT OF THE BURIRHAT AGRICULTURAL STATION FOR THE YEAR 1913-14.

1. Introduction.

The work of the past, viz., the growing of first class cigar wrappers, good American cigarette and Turkish cigarette tobaccos, and the curing of the same, was continued during the period under review with definite negative results.

The high prices and good valuations received for tobacco grown on this Farm on small areas in 1911 and 1912 encouraged us to believe that we had only to grow a large crop to place the work on a practical basis, but in the light of later experience these views have had to be modified.

Flue-cured American cigarette tobacco from Rangpur has no more value to the cigarette manufacturers of this part of India than ordinary shade-cured local tobacco. We have been offered only Rs 15 per maund for flue-cured tobacco, while the same price has been paid to local cultivators for shade-cured. There is therefore no possibility of the local raiyat taking to flue-curing with such prices. Moreover, American tobacco only yields half the outturn of local, so it has been decided to give up the cultivation of this tobacco entirely for the present. I have not yet obtained the quantities of American unmanufactured cigarette tobacco imported into this country per annum, but all the manufacturers seem to be employing only the very cheapest leaf for cigarettes.

Macropolo & Co. inform us they have no use for Turkish tobacco grown at Rangpur in 1913-14. Only a few seers of this tobocco have been grown and cured.

Good prices were obtained for Sumatra cigar wrappers up till the year 1912, but from 1912 to 1914 the prices obtained were unsatisfactory. Latterly, however, the Madras demand has improved and it is therefore proposed to continue the attempt to acclimatise this tobacco in Bengal.

It has been proved beyond the shadow of a doubt that large areas of land on this Farm are barren. Twenty acres were put down in tobacco, but it was only possible to harvest a crop from 7 acres, from which much inferior tobacco was produced. From the 7 acres an average outturn of 8¼ maunds (876 pounds) was obtained.

Receipts for the year were Rs. 1,739-14-3, while expenditure was Rs. 8,316-2-3 inclusive of capital Rs. 450 and establishment Rs. 3,069.

2. Situation and Brief History.

The Farm is situated at Burirhat, 5 miles north of Rangpur town, on the border of a large tobacco-growing belt in the Rangpur district. The land was acquired in 1907; an establishment was maintained at the Farm from July 1908; and pucka buildings were supplied in 1910-11.

3. Area.

The station is 52 acres in extent, and it is divided into five blocks known as blocks A, B, C, D and E, respectively Of this area 38 acres are cultivable, while 14 acres are occupied by roads, buildings, bamboos, grazing and tank. Of these 38 acres, 23 are barren.

Block.	Area in acres.	Treatment, 1913-1914.	Remarks.
A	5	*Dhaincha* green-manured in summer 1913. Winter— 2 acres tobacco. 3 „ oats and peas.	There was a little improvement in the crops in 1913-14, but 3 acres are nearly barren. Tobacco was poor.
B	3½	*Aus* paddy in summer. Fallow in winter.	This area is good.
C	8	*Dhiancha* green-manured in summer. In winter— 5⅕ acres tobacco. 1⅘ „ oats and peas. 2 „ Sumatra. Only 1 acre was harvested. 2⅕ „ American cigarette tobacco. Half failed. 1 „ Turkish tobacco. Crop was fair.	A fair crop of tobacco was grown on 3 acres. Rest failed.
D	10	Green-manured in summer. In winter— 5 acres tobacco. 5 „ oats and peas.	Only 2 acres of American cigarette tobacco were harvested.
E	12	In summer *dhaincha* green-manured. In winter 7½ acres tobacco.	The tobacco crop failed.

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Although about 20 acres of tobacco were grown, only 7 acres were good enough to harvest, the remainder being ploughed under.

From the crop harvested we expect to cure the following crop :—

Sumatra ...	12	maunds	American cigarette tobacco
White Burley	35	„	
Little Flemingen	7	„	
Turkish ...	4	„	
	58		

i.e., a crop of 58 maunds from 7 acres, or an average outturn of $8\frac{1}{4}$ maunds per acre, neglecting the $12\frac{1}{2}$ acres that were too poor to harvest.

4. Irrigation.

The average rainfall of this district is about 82 inches, and most of this falls between April and September inclusive. This is sufficient for ordinary crops, whose chief growth takes place during these months; but the tobacco crop grows from November to February inclusive, when little or no rain falls. On account of the sandy condition and high elevation of the land irrigation becomes of very great importance for this crop. This is generally done from shallow kutcha wells. One or two irrigations generally suffice.

5. Character of the Soil.

The soil is a poor sandy loam on a subsoil of almost pure sand, while pure sand occurs at one foot below the surface. Lime is absent altogether. Large areas of the Farm were quite barren last year and refused to grow any crop. We hope by green-manuring and liming to improve the soil.

6. Meteorology.

The table below gives the rainfall and number of rainy days during 1913-14 as compared with the normal:—

	Actual rainfall.		Normal rainfall for district.	
	Rainfall.	Number of rainy days.	Rainfall.	Number of rainy days.
1913.				
April	·58	3	3·01	4·3
May	8·86	11	10·66	11·5
June	24·03	11	18·00	15·7
July	26·10	13	15·89	15·0
August	15·62	14	12·80	13·7
September ...	19·69	10	14·24	13·3
October ...	6·13	3	4·87	4·4
November ...	.....	.....	0·12	0·2
December ...	·50	1	0·05	0·2
1914.				
January ...	...	.....	0·50	0·9
February ...	1·72	1	0·54	1·2
March	·14	1	0·25	1·8
	103·37	68	81·93	82·2

Although the year was very rainy, this moisture did dot affect the tobacco crop, and irrigation was necessary in January. From the paragraphs on area, irrigation, soil and meteorology of this Farm above, it is obvious that we are dealing with very poor soil that requires manuring and irrigation; and the problem now is to find out how these operations can be carried out economically.

Temperature.—The following table gives the temperatures recorded in the shade on this Farm:—

Highest ... ... 107° } in year 1913-14.
Lowest ... ... 40° }

	Maximum.	Minimum.
1913.		
April	91·23	74·9
May	87	74·7
June	88·6	78·2
July	88·6	79·3
August	91·6	79·2
September	92·4	75·6
October	92·7	75·5
November	93·5	62·5
December	81·5	53·4
1914.		
January	91·4	53
February	95·5	52
March	104·6	61·5

7. Operations during the year.

As the greater part of the soil of this farm is poor and barren, the summer was employed in growing a crop and green-manuring the same. This in itself was not enough, and now liming will be taken up as a further improvement. There are, however, small areas that grow fairly good crops of tobacco. These were put down in Sumatra, American cigarette tobaccos, and Turkish cigarette tobaccos. Sumatra yields a good cigar leaf wrapper after being shade-cured; while American cigarette and Turkish cigarette tobaccos require flue-curing to obtain the requisite bright and yellow colour.

Each variety was sown in seed-bed in September and planted out in October and November, while harvesting began in January. To obtain the best quality of leaf it is necessary to have luxuriant growth, and hence our anxiety to improve the soil. From the paragraph on area it will be seen that the yields per acre in 1913-14 were very poor. This corroborates the work of 1912-13, when the following outturns per acre were obtained: Sumatra 6¼ maunds, American 10 maunds, and Turkish 5 maunds. Accordingly we can state definitely that the quantity of tobacco leaf produced on this Farm per acre on fairly large areas is poor.

B.—Prices realized.

The following figures give prices obtained for tobaccos grown on this Farm:—

SUMATRA CIGAR WRAPPER LEAF, SOLD IN TRICHINOPOLY.

Year.	Amount of crop sold.	Price per lb.	Total receipts.
	lbs.		Rs. A. P.
1909-10 ...	1,096	7 to 12 Annas ...	587 11 0
1910-11 ...	1,404	Grade A—Rupees 1-4 ... „ B— „ 1 .. „ C—Annas 12 ...	1,555 1 0
1911-12 ...	1,050	lbs. 200—Grade A—Rupee 1 458— „ B—Annas 15 112— „ B— „ 11 50— „ C— „ 5 230— „ D— „ 8	837 0 0
1912-13 ...	453	lbs. Grade A—147 @ Annas 14 „ B— 74 @ „ 12 „ C— 125 @ „ 10 „ D— 89 @ „ 8 „ E— 9 @ „ 8 „ F— 9 @ „ 4	313 8 0
1913-14 ...	1,634	lbs. 170—Grade A @ Rupees 1-2 330— „ B @ Annas 14 285— „ C @ 6 295— „ D @ 8 380— „ E @ 4 174— „ F @ 2	855 0 0

AMERICAN CIGARETTE TOBACCO.

Year.	Outturn.		Price obtained per md. of 82 lbs.	Total receipts.
		lbs.	Rs. A. P.	Rs. A. P.
1910-11 ...	White Burley ...	410	37 8 0	757 8 0
	Little Flemingen ...	574	35 0 0	
	Connecticut seed leaf	1,066	25 0 0	
		2,050		
		Grade.		
1911-12 ...	White Burley Little Flemingen Connecticut seed leaf.	A—162 B—748	32 8 0 25 0 0	296 4 0
1912-13 ...	White Burley Little Flemingen	3,422	20 0 0	835 0 0
1913-14 ...	White Burley Little Flemingen	Valued at	15 0 0	

The defects of our American cigarette tobacco are said to be first want of body, second possesses a bitter taste, and third burns the throat when smoking.

TURKISH TOBACCO, SOLD IN BOMBAY.

Year.	Kind and quantity sold.		Price realized per lb.	Total receipts.
		lbs. Grade.		Rs. A. P.
1910-11 ...	Some Sown ... Cavella ... Sari .. Ayasalouk ...	38 A—56 B	Rupee 1 Annas 9¾	34 0 0
1911-12 ...	22lbs ...	22	„ 13⅔	18 12 0
1912-13 ...	No. I ...	178	„ 12⅔	361 4 0
	„ II ...	186	„ 9¾	
	„ III ...	124	„ 8¾	
	„ IV ...	102	„ 5⅞	

C.—Distribution of Seed.

The following seeds were supplied:—

Local Rangpur tobacco	20 ounces.
Exotic	24 „
Oats	10 maunds.

D.—Practical Training.

Two students received training at this station during the year.

8. RECEIPTS AND EXPENDITURE.

Total Receipts and Expenditure of the Farm from 1st April 1913 to 31st March 1914.

Receipts Rs. 1,739-14-3, excluding the price of 41 maunds 30 seers White Burley tobacco sold to the Globe Cigarette Co., Calcutta, which has not yet been received.

Expenditure—

	Rs. A. P.	Rs. A. P.
Purchase of cattle	56 0 0	
Feed of cattle	126 10 0	
Purchase of seeds ...	27 6 0	
Purchase of manures	719 12 0	
Wages of labourers ...	2,741 3 6	
Petty construction	105 3 0	
Railway and steamer freight ...	186 1 6	
Cart and cooly hire	13 8 3	
Service postage	56 0 0	
Office expenses	6 0 9	
Miscellaneous	759 5 3	
		4,797 2 3
Capital (construction)	450 0 0	450 0 0
Establishment	3,069 0 0	3,069 0 0
Total ...	.....	8,316 2 3

9. MANAGEMENT AND INSPECTIONS.

The Hon'ble Mr. P. C. Lyon visited the Farm in October last. The Director of Agriculture, Bengal, made four inspections, while the Deputy Director of Agriculture inspected frequently during the year. Mr. Low, the Director of Agriculture, Central Provinces, also found time while at Rangpur to see the work of this station. Babu J. K. Biswas was in charge throughout the period with the exception of the month of August, when he took privilege leave.

F. SMITH,

Deputy Director of Agriculture, Bengal.

EXPERIMENTAL SCHEME FOR THE BURIRHAT FARM FOR 1914-15.

BURIRHAT FARM.

	Acre.
Cowpeas (green manured)	30
Aus paddy	7
Tobacco	7
Oats and peas	10-16
Mustard	10-15

Tobacco.—(*a*) *American cigarette tobacco varieties.*—The object of this experiment is to find whether Virginian tobacco can be grown and cured economically in Bengal, and which variety of American cigarette tobacco is most suitable for the soil and climate of Rangpur—

(1) White Burley. | (3) Little Flemingen.
(2) Cannon „ | (4) Yellow rior.

(*b*) *Turkish cigarette tobaccos.*—The aim of this experiment is to find out whether Turkish tobacco can be grown economically in Bengal, and which variety is moss suitable—

(1) Some sown. | (3) Sari.
(2) Cavalla. | (4) Ayasalouk.

(*c*) *Cigar-wrapper leaf.*—This experiment is to find out if the following varieties produce a good leaf for cigar-wrappers—

Sumatra. | Uncle Sam.

(*d*) *Curing.*—Flue-curing will be carried out on cigarette tobacco, while cigar-wrapper leaf tobacco will be shade cured.

(*e*) Seed is grown for distribution.

ANNUAL REPORT OF THE RANGPUR DEMONSTRATION FARM FOR THE YEAR 1913-14.

Introduction.—The results, positive or negative, obtained at the farm for the period under review ought to be useful for the district. The soil of this station is representative of a large tract of country and the area of 20 acres appeals to a very large class of people. The average outturn of 19·3 maunds (1 md. = 82 lbs.) of rice per acre off 10 acres is only fair and can easily be increased to 30 maunds per acre, while only 1 acre of jute was grown in rotation with rice, instead of 5. These facts show that the management can easily be improved upon. The Overseer in charge, however, has only two years' experience, and although 13 out of a possible 16 acres were cultivated during the year, the expenditure was more in proportion to receipts (*see* Appendix I) than has been the case in the past. For the first time on record a net profit has been made of Rs. 700, as compared with the net loss of Rs. 5,365 in 1907-08. A good outturn from this farm per annum would be 12 acres of winter rice at 30 maunds per acre; 5 acres of jute at 20 maunds per acre; 2 acres of sugarcane at 100 maunds of *gur* per acre and 2 acres of potatoes at 200 maunds per acre. Given normal conditions, I have no doubt that the present Overseer will be able to arrive at such results with two or three years' more experience.

The following figures were obtained in 1913-14:—

(1) Twenty maunds (1,640 lbs.) of jute fibre in rotation with 18 maunds (1,476 lbs.) of rice (unhusked) were grown in the same year on 1 acre of land. Local market value, Rs. 309.

(2) An excellent crop of thick cane was produced, of which nearly 100,000 cuttings were distributed.

(3) Two hundred and five maunds (7½ tons) of Italian potatoes per acre were grown on half an acre.

(4) Fine badshabhog rice from the Burdwan Division was found as prolific as local coarse batho. It also is sold locally 10 annas per maund dearer than batho. Badshabhog was grown on a large area and 30 maunds have been distributed as seed to local cultivators.

(5) An average outturn of 20 maunds (1,640 lbs.) of Hewti (local) jute per acre was harvested from 3 acres.

(6) The Meston plough and Planet Junior hand hoes are suited to the light friable soils of this district. During the year 90 ploughs, of which 46 have been paid for and 8 hoes, of which the price of 3 has been realized, have been distributed in this district by the District Agricultural Officer under Mr. Chakravarty's instructions.

2. *Situation and brief history.*—The farm is situated in Rangpur town. The land was acquired by the Rangpur District Agricultural Association and made over to Government in 1905 for the purpose of opening a tobacco experiment station. After three years it was found that the land was not suitable for the purpose required, so Government made over the farm to the District Agricultural Association on 1st August 1908 and opened a tobacco station at Burirhat near the tobacco tract, 5 miles from Rangpur. Government continued to subsidise the farm, but it was found desirable after another three years to take over complete charge of the farm; so again the station came under the complete control of the Agricultural Department on 1st August 1911.

From 1908 tobacco was given up at this farm, and experiments on the chief agricultural crops of the district were carried out.

3. *Area.*—The area of the farm is 20 acres. Of this, 16 acres are under cultivation, while 4 acres are occupied by roads, buildings, bunds, channels and pits. Of the 16 acres, 4 are highland suitable for jute, sugarcane, potatoes and *rabi*, while 12 acres are essentially *aman* paddy land. The land has been laid out into convenient plots. There are 2 acres of very low land that will only grow deep-water paddy.

4. *Irrigation.*—There is no arrangement for irrigation at this farm. The land depends entirely on natural rainfall. With an average normal rainfall of 81·93 inches and 81·8 rainy days in the year spread over seven months, most crops can grow very well. In fact, there is sufficient rainfall to allow of *rabi* sowings and the January and February rains generally suffice to bring the crops to maturity.

5. *Character of the soil.*—The soil is a rich open loam, rich in nitrogen, phosphoric acid and potash but poor in lime, while the subsoil is sandy. The area represents a large tract of land in the Rangpur district.

6. *Meteorology.*—The following table gives the approximate normal rainfall of Rangpur with the number of rainy days and the actual rainfall in 1913-14:—

	Actual rainfall in inches.		Normal rainfall.	
	Amount.	Number of rainy days.	Amount.	Number of rainy days.
1913.	Inches.		Inches.	
April	·26	2	3·01	4·3
May	9·50	12	10·66	11·5
June	26·88	17	18·00	15·7
July	21·37	12	15·89	15·0
August	21·04	18	12·80	13·7
September	15·83	15	14·24	13·3
October	7·64	5	4·87	4·0
November	*Nil*	*Nil*	0·12	0·2
December	·60	1	0·05	0·2
1914.				
January	*Nil*	*Nil*	0·50	0·9
February	1·02	2	0·54	1·2
March	93	3	1·25	1·8
Total ...			81·9	81·8

7. *Operations during the year.*—The following table gives the area of different crops grown on the farm during 1912-13 with the outturn and yield per acre in each case :—

A.—General Crops Grown.

Crop.	Area in acres.	Total outturn.	Yield per acre.	Remarks.
		Mds.	Mds.	
Rice paddy (*Oryza Sativa*).	10	193	19·3	Good.
Jute (*Corchorus Capsularis*).	3	60	20	Very good.
Sugarcane ...	½	The crop was reserved for cuttings.	...	The crop was very good in both cases : 96,171 cuttings were sold.
Ratooned do.	½		...	
Potatoes ...	½	51¼	102½	

B.—Experimental Work.

1. *Winter rice, Transplanted Paddy—Oryza Sativa—Varieties—Object.*—To see how fine Burdwan rice (badshabhog) compares economically with local coarse (batho).

	Acres.	1913-14. Outturn.	Yield per acre.	1912-13. Yield per acre.
		Mds.	Mds.	Mds.
Badshabhog	7	137½	19⅝	19⅛
Batho (local)	2⅔	51¾	20⅝	12⅛

These results corroborate those of the previous year.

Badshabhog can therefore be recommended as a fine variety for this district as the outturn is larger per acre, while the seed is priced locally at 10 annas per maund above the local coarse paddy.

Badshabhog yields fine white rice, while batho yields coarse red rice. Seed selections should be carried out on badshabhog and batho should be given up.

2. *Jute (Corchorus Capsularis).— Object.*—To see what outturn per acre of fibre could be obtained.

Area.	Outturn.	Yield per acre.
Acres.	Mds.	Mds.
3	60	20

3. *Rotation—Jute and paddy— Object.*— To see what outturn of jute and paddy could be obtained off the same land in the same year.

Area.	Outturn.
1 acre	Jute, 20 maunds or 1,640 lbs.
	Rice, 18 ,, or 1,476 lbs.

This is the only authentic record I can obtain of jute and paddy on the same land in one year in this division.

4. *Sugarcane.*—Four varieties were grown—

Dacca Gandheri ... ..
Striped Mauritius ... ...
Striped Tanna ... ...
White ,, ...

In 1912 the crop off half an acre yielded *gur* at the rate of 102½ maunds per acre. In 1913 the crop was reserved for seed (cuttings).

An excellent crop of cane was grown from which 96,171 cuttings were sold.

Potatoes (Solanum Tuberosum)— Object.—To see whether Italian potatoes suit this district.

Area.	Outturn.	Yield per acre.
Acres.	Mds.	Mds.
½	51¼	102½

This crop was grown without irrigation.

C.—Distribution of Seed.

The following seeds were distributed from this farm in 1913-14.—

Jute seed	½	maund.
Sugarcane cuttings	96,171	cuttings.
Badshabhog paddy	30	maunds.
Mustard	5¾	,,

Implements were supplied direct from Calcutta by the Agricultural Supervisor.

D.—Practical Training of Young Men.

No one was trained at this farm during the year 1913-14.

8. *Receipts and Expenditure.*—In 1913-14 receipts were Rs. 3,082-4, while the expenditure was—

	Rs.	A.	P.
Establishment	332	10	6
Cattle food	86	11	6
Labour	1,606	9	3
Miscellaneous expenses	441	11	3
Total ...	2,467	10	6

9. *Management and Inspection.*—The farm is under the Department of Agriculture Bengal, and the expense is defrayed by Government. Babu Jamini Nath Chakravarty was in charge during the year. He worked well.

[Mr. Smith inspected the farm frequently and Mr. Blackwood inspected the station several times during the year.]

F. Smith,

Deputy Director of Agriculture, Bengal.

APPENDIX I.

Comparative statement of expenditure of the Rangpur Demonstration Farm from 1905-06 to 1913-14.

Year.		Contingency.	Establishment.	Capital.	Grand total expenditure.	Loss excluding capital.	Remarks.
		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
1905-06	Expenditure	3,043 15 4	2,321 3 3	3,305 2 7	8,670 5 2	4,966 11 4	Under Bengal Agricultural Department up to Partition when under Eastern Bengal.
		5,365 2 7					
1906-07	Receipts ...	398 7 3					
	Expenditure	2,356 3 9	2,100 0 6	631 10 2	5,087 14 5	3,616 0 6	Under Eastern Bengal Agricultural Department.
		4,456 4 3					
1907-08	Receipts ...	840 3 9					
	Expenditure	2,912 2 1	3,438 0 0	6,837 0 0	13,187 2 1	5,365 6 10	Ditto ditto.
		6,350 2 1					
1908-09	Receipts ...	984 11 3					
	Expenditure	3,681 3 3	641 14 4	1,874 3 4	6,197 5 11	3,390 8 1	Under District Agricultural Association from 1st August 1908.
		4,323 1 7					
1909-10	Receipts ...	932 10 6					
	Expenditure	2,617 8 5½	1,191 7 2½	2,334 11 3	6,143 10 11	2,137 14 0	Under District Agricultural Association.
		3,508 15 8					
1910-11	Receipts ...	1,617 1 7					
	Expenditure	2,504 4 11	396 0 0	280 0 0	Not traceable 3,180 4 11	1,644 14 8	Ditto ditto. Under Bengal Agricultural Department from 1st August 1911.
1911-12		2,900 4 11					
	Receipts	1,255 6 3					
	Expenditure	2,103 7 0	300 0 0	787 9 0	3,191 0 0	839 6 9	Under Bengal Agricultural Department. Potato crop was totally destroyed by *Phytophthora*. This alone caused a loss of Rs. 500.
1912-13		2,403 7 0					
	Receipts ...	1,564 0 3					
	Expenditure	2,075 0 0	300 0 0	.....	2,375 0 0	Profit of— 707 4 0	Under Bengal Agricultural Department.
1913-14		2,375 0 0					
	Receipts ...	3,082 4 0					

CROPPING SCHEME FOR THE RANGPUR FARM FOR 1914-15.

RANGPUR FARM.

	Acre.	
Jute ...	... { 2	followed by paddy.
	{ 1	followed by potatoes.
Aman paddy ...	... 10	
Sugarcane ...	... 1	
Total	... 14	
Paddy ...	... 2½	unmanured.
	2½	dhaincha green manure.
	2½	bonemeal, 3 maunds per acre.
	2½	(50 maunds cowdung followed by *khesari* or gram.)

Seed selection will be carried out on jute and winter rice, while cane will be grown for distribution purposes.

ANNUAL REPORT OF THE BURDWAN FARM FOR THE YEAR 1913-14

THE year 1913-14 was remarkable for excessive rains in May and June and floods in August. The excessive rains in May and June, when 9·73″ on 11 days and 19·69″ on 22 days were recorded instead of a normal of 5·08″ on six days and 10·17″ on 12 days, respectively, were too much for the jute crop which never thrived and finally died off.

Owing to the Damodar river breaking its banks on the 8th of August this farm was flooded 6′ deep on the 9th, and for the following five days the flood water did not subside entirely from the farm with the result that the whole of the paddy crop that had been recently transplanted on 20 acres and all seedlings were destroyed. New seedlings were hurriedly despatched from Chinsura and 18 acres of rice were retransplanted, which resulted in a crop of 216½ maunds of grain, or an average outturn of 12 maunds or 984 lbs. per acre. Under the circumstances this result is an excellent one and shows that foresight in having surplus seedlings at Chinsura saved the situation to a great extent in spite of the farm having been flooded so late in the season. The cane crop supported the flood very well and a fair harvest was obtained.

The following table gives details of rainfall :—

Names of months.	Actual rainfall in inches.	Number of rainy days.	Normal of 40 years.	Normal of rainy days.
April 1913	0·24	1	2·20	3
May ,, ...	9·73	11	5·56	6
June ,, ...	19·69	22	10·17	12
July ,, ...	12·48	22	12·32	15½
August ,, ...	11·83	23	11·49	15
September ,, ...	10·07	13	8·59	11
October ,, ...	3·33	4	3·93	4
November ,, ...	0·14	2	0·64	¾
December ,, ...	Nil	.....	0·13	¼
January 1914	Nil	.....	0·38	¾
February ,, ...	5·49	4	0·89	1½
March ,, ...	Nil	.....	1·24	1¾
Total	73·00	102	57·54	71½

Jute.—Failed.

Rice.—From 18 acres 216½ maunds of grain were obtained.

Sugarcane.—Java and khari varieties of cane were grown. A fair crop was obtained and 4,030 khari cuttings and 6,630 Java cuttings were distributed, the remaining crop being turned into *gur*.

Potatoes.—Italian potatoes were grown on two-thirds of an acre from which 95¾ maunds were obtained or an outturn of 143 maunds or 5·23 tons per acre.

Accounts.—The following statements show the receipts and expenditure were incurred at this farm during the year : —

	Rs.	A.	P.
Receipts.			
Deposited into Treasury on account of sale-proceeds	906	14	3
Bills receivable	257	9	0
Stock in hand	110	0	0
	1,274	7	3
Balance	2,175	9	3
	3,450	0	6

Expenditure.

Establishment.

	Rs.	A.	P.
Superintendent's pay and travelling allowance ...	603	5	0

Capital.

	Rs.	A.	P.			
Implements	74	9	0			
Construction of kutcha sheds ...	109	12	6			
Furniture	3	9	3			
				187	14	9
Cattle food				96	3	3
Extra labour				2,131	14	9
Manures				93	3	0
Seeds				150	7	6
Contingencies				84	12	0
Office expenses				10	0	0
Stamps				10	0	0
Taxes and water-rate				82	4	3
Total ...				3,450	0	6

This farm of 32 acres belongs to the Maharajadhiraj of Burdwan who pays all expenses. Babu J. C. Dey was in charge throughout the year and it was owing to his energy that any rice crop at all was obtained.

[The Deputy Director inspected the farm frequently and the Director twice during the year.]

F. Smith,
Deputy Director of Agriculture, Bengal.

CROPPING SCHEME FOE THE BURDWAN FARM FOR 1914-15.

Burdwan Farm.

Seed selection will be carried out on paddy and jute, while cane will be grown for distribution—

Winter rice	... 20 acres	... 3 acres unmanured. 17 „ bonemeal, 3 maunds per acre every alternate year. 5 acres dhaincha (green manure). 5 „ cowdung, 50 maunds per acre. 5 „ bonemeal as above. 2 „ rotated with jute.
Jute	... 5 „	... 100 maunds cowdung. Rotate as much as possible with winter rice.
Sugarcane	... 4 „	... 200 maunds cowdung 8 „ castorcake } per acre.

ANNUAL REPORT OF THE KALIMPONG DEMONSTRATION FARM FOR THE YEAR 1913-14.

Introduction.—A further year of good work was carried out at this farm during the period under report, as will be gathered from the details given below. From the figures it will be seen that on this land which lies at an elevation of 3,317 to 3,864 feet above sea level and is subjected to a rainfall of about 100 inches per annum, the most economical practice is to grow maize in rotation with *kodo* on the same land in one year. From such procedure an outturn of 33½ maunds or 2,726½ lbs. (82 lbs.=1 maund) of maize (grain) plus 27½ maunds or 2,255 lbs. of *kodo* (grain) (*Eleusine Córácana*) per acre, showing a net profit of Rs. 86-12 (*i.e.*, £5-15-8) may be expected.

The rent of such land in this district is Re. 1-4 or 1*s.* 8*d.* per acre.

To obtain these figures the average outturn of 17½ acres of maize and 2½ acres of *kodo* have been taken. The superiority of *kodo* over other crops is demonstrated by the fact that 10⅛ acres of *kodo* were also grown on the half-share system (*i e.*, the landlord provides the land, while the cultivator supplies all labour and seed and gives half the crop plus the straw at harvest time).

Other rotations can be substituted for the above, such as maize and buckwheat (*Phaphar Fagopyrum Esculentum*) or maize and soy bean (*bhatmas*) (*Glyceni Hispida*); but they are not so economical as the former rotation, nor are they as popular with the local cultivators.

On the half-share system it is evident that the landlord obtains a much larger return than he would from renting the land.

Excellent work was done on seed selection with maize—the average outturn of this crop on 17½ acres being 31¾ maunds, while on acre-blocks 37¼ maunds and 38 maunds respectively were obtained.

Touli rice again maintained its superiority for this hillside, but the average outturn of 16¾ maunds per acre shows that growth was not at a maximum and that the farm is not peculiarly suited to the cultivators of this crop. Possibly the elevation of the land, the water-supply and the temperature may account for the low yield, as from the treatment given we ought to have obtained at least 30 maunds of grain per acre.

Terracing on these hillsides is a matter of slope and size of holding. There has been no advantage so far in terracing on this farm from the maize crops grown, although the terracing took place in 1909 at a cost of Rs. 100 per acre. Of course rice could be grown on the terraces if wanted, but from the figures above and below it is obvious that maize is a more economical crop than rice. *Aus* paddy (*ghaiya*) gives an enormous yield of straw.

Jute is not suited to this elevation, while sugarcane takes 18 months to come to maturity. Wheat, oats, barley and *uwa* grow well on this hillside, but the outturn depends on the rainfall of the period November-February which is very uncerta in. They would replace *kodo*, buckwheat or soy beans which are more certain and which come to maturity in November-December.

Much useful work has thus been done at the farm and the item that is capable of immediate practical application by the cultivators of this hillside is the use of the improved maize seed. All the raiyats employ mixed grain for seed while they can obtain at this farm at the ordinary market price pure and improved seed. Out of the stock of 600 maunds of maize produced at this farm in 1913 there have been demands for only 5 maunds. It is necessary to bring the above seed to the notice of the inhabitants of these regions and for this purpose the best agency would be to get the Rev. Dr. Sutherland of Kalimpong and his teachers interested.

2. *Situation and History.*—The village of Kalimpong is the head-quarters of the subdivision of Daling (a Government estate of 401 square miles). The district was taken from Bhutan by the British Government after the Bhutanese War of 1864-65. The settlement of the estate restricts the ownership of land to hill tribes, and at the same time makes provisions by which Lepchas and Bhutias are only allowed to dispose of their land among themselves. This condition was introduced to prevent the more thrifty and enterprising Nepalese from becoming possessors of all the land in the district, which would to a great extent have been the case had no steps been taken to prevent it.

All transfers of land go through the Khas Mahal Office, and an annual ground-rent of from As. 6 to Re. 1-4 is charged by Government.

Kalimpong has a fairly large bazar and is the mart for produce of a considerably large area, in addition to which it is the centre of Tibetan trade with Bengal.

It is 9 miles from Tista Bridge, 38 miles from Siliguri station (Eastern Bengal State Railway), and 28 miles from Darjeeling; Ghoom station (Darjeeling-Himalayan Railway) being 4 miles nearer.

The Demonstration Farm is situated below the bazar on the easterly slope which runs down to the Rilli river, a tributary of the Tista joining the latter at Riang.

Although about 24 acres of land had been cultivated by the Homes prior to April 1907, the remaining portion was not taken over from the native cultivators until December of that year, so that work can be said to have commenced on this farm in 1908.

Cultivation, building of roads and boundary pillars and erection of buildings occupied most of the time during the first two years.

3. *Area, Elevation.*—A survey of the farm was completed in April 1911 at a cost of Rs. 136-0-6. The plots were all numbered and the area computed. The total area, exclusive of *jhoras*, is 60·78 acres, of which 9·54 are occupied with roads, houses, farm buildings, waste ground and land under trees and bamboos, leaving 51·24 acres for cultivation. During the year under report 23·9 acres were under experimental cultivation, the remainder being partly cultivated under ordinary crops and partly given to coolies on half-crop system. The elevation is as follows:—

	Feet.
Lower boundary	3,317
Farm buildings	3,693
Upper boundary	3,864

The level section through the farm from top to bottom shows an average gradient of 1 to 5. This is a very moderate slope for these hills and gives a situation difficult to improve on for experimental work.

4. *Irrigation.*—The only irrigation necessary is for the rice crop, and this consists of turning the water out of one of the many streams on to the rice terraces when needed. In the winter no irrigation is possible, but few crops grow at that season.

5. *Character of the soil.*—The soil is a rich clay loam whose reaction is acid.

6. *Meteorology.*—The following table shows the normal rainfall for five years and that of 1913 at the Demonstration Farm:—

Month.	Normal five years.		1913.	
	Rainfall.	Rainy days.	Rainfall.	Rainy days.
	Inches.		Inches.	
January	·28	1½	·21	1
February	1·07	6	1·47	8
March	3·70	5½	4·49	5
April	4·33	16	·66	3
May	5·43	18½	6·15	20
June	16·41	22	32·85	24
July	27·93	28	20·15	26
August	21·82	26	18·51	32
September	10·46	16½	5·28	18
October	4·97	8½	4·74	7
November	6·56	4	1·26	4
December	·05	1½	3·11	9
	103 01	154	98·88	157

1914.	Rainfall. Inches.	Rainy days.
January	·99	2
February	1·75	3
March	·63	5

The rainfall was very favourable for all crops in 1913. The maize crop was well forward to support the heavy rains of June and July while the winter rains were particularly favourable for such crops as barley.

8. *Operations during the year—A—General crops grown.*—The following table gives the area under each crop grown by the farm and on the half-share system, with the total outturn, yield per acre, price per maund (82 lbs.), cost of cultivation per acre and profit per acre :—

Crop.	Area in acres.	Outturn in maunds. (1 maund =82 lbs.)	Yield per acre.	Price per maund.	Cost of cultivation per acre.	Profit per acre.
			Mds.	Rs. A.	Rs. A.	Rs. A.
Maize	17½	556	31¼	3 0	38 0	55 12
½ crop	10½	61¼	5	...		17 7
Rice (aman) ...	10½	Gr. 147⅛	14	2 12	45 0	9 8
		St. 385	36⅔	0 7		
Aman (dhan) ...	...	...	...	...	...	...
½ crop	6½	Gr. 60½	9⅓	...	...	31 8
		St. 90⅛	14	...		
Kodo ...	2¼	61¾	27½	3 4	58 0	31 0
„ ½ crop ...	10⅛	56¼	5½			17 4
Buckwheat ...	2	21½	10¾	2 8	23 0	3 14
⅓ crop ...	1	3¼	3¼			8 12
Ghaiya or aus paddy ...	½	Gr. 11¼	22½	2 12	18 7	52 9
		St. 74½	149	0 1		15 10
						Loss—
Bhatmas (soy bean) ...	3¼	40	13	3 2		Rs. A.
Kalai	2	9¾	5	4 6	25 0	3 2
Gahat	⅓	3¼	10	3 2		6 4
Mashyem	½	4	8	3 2		
Jau (barley) ...	¼	4	16	3 0	34 0	24 0
Sugarcane ...	½	5,592 canes	11,184 canes @ 1 pice each.	...	...	...
Khar (thatching grass) ..	1½	... ..	...	...	...	...

From the above figures it is evident that maize and *kodo* in rotation are the most economical crops for this hillside. *Kodo*, buckwheat, soy beans and *kalai* are grown after maize on the same land in the one year, but none of the latter-named crops is so popular as *kodo*. Rice grown on the half-share system is much more profitable than when grown by the farm. Maize, *kodo* and buckwheat grown on the half-share system are not so profitable as rice, but they all yield a much larger return than is obtained by mere rent.

B.—Experimental work.—

Primary
1. Maize.
2. Winter rice (aman dhan).

Secondary
3. Autumn dhan (aus dhan).
4. Kodo.
5. Buckwheat.
6. Soy beans.
7. Miscellaneous.

1. *Zea Maye—Maize—Makai—Butta.*—In 1907-08 experiments were commenced with a view to improving the crops as grown in this district and also to compare it with Jaunpore maize. The latter after two years' trial, with poor results, was discontinued. Attention was then concentrated on the improvement of the local varieties by means of seed selection.

The maize at the commencement was of a very mixed nature, containing seeds of all colours and required seed-to-seed collection. The first few years' trials, however, separated the crops into several varieties, and by the subsequent selection of the best cobs of each type we have obtained fine varieties fairly true to type, *i.e.*, yellow round, yellow flat, white round, white flat and red round.

The average outturn of maize of all varieties under cultivation for the last few years is here given :—

	Per acre.			
	Mds.	s.		lb.
1909	21	21	or	1,764
1910	27	25	„	2,264
1911	30	9	„	2,478
1912	33	8	„	2,722
1913	33	30	„	2,766

These are remarkable figures and a striking illustration of the benefit to be derived from careful selection of seed.

Seed rate, 25 seers per acre. Seed time, second or third week of March. Manure, 300 mds. cowdung. Harvest, end of August to middle of September. The proportion of grain to cobs with leaves attached is 51 per cent.

Varieties —The variety experiment has shown the following results :—

Variety.	Outturn.				
	1909.	1910.	1911.	1912.	1913.
Round yellow ...	19¼	29½	33¼	37	37¼
Flat yellow ...	37¼	36¼	36	31	26¾
Round white ...	26¼	32¾	33¼	29	33¼
Flat white ...	28¼	35½	29¾	41½	35
Red ...	19¾	30¼	31¼	37	30½

These outturns are from one-acre blocks and the figures backed up by the average for the farm require no comment.

Effects of terracing.—To compare the result of growing ordinary crops (not irrigated rice) on terraced and unterraced land, 2 acres were selected as uniform in fertility and slope as is possible to find on the farm. One acre was terraced at a cost of Rs. 107-5-6. Each plot receives similar treatment, equal amounts of manure and seed being applied to each.

The following table shows the outturn and cost of production of maize and secondary crops for last two years :—

Terraced acre.			Unterraced acre.		
Crop.	Outturn.	Cost of cultivation.	Crop.	Outturn.	Cost of cultivation.
1911.	Mds. s.	Rs. a. p.	1911.	Mds. s.	Rs. a. p.
Maize ...	33 5	40 1 3	Maize ...	38 32	41 11 0
Soy bean—			Soy bean—		
Grain ...	11 35	20 8 6	Grain ...	9 22	24 4 0
Straw ...	15 20		Straw ...	12 10	
1912.			1912.		
Maize ...	32 28	44 14 6	Maize ...	36 2	44 14 6
Kodo—			*Kodo*—		
Grain	22 10	49 6 3	Grain ...	24 20	52 15 3
Straw ...	Estimated Rs. 5.		Straw ...	Estimated Rs. 5.	
1913.			1913.		
Maize ...	30 0	37 10 0	Maize ...	35 20	37 10 0
Kalai ...	5 0	25 0 0	*Kalai* ...	4 30	25 0 0

During the four years of experiment maize has been grown on each of these plots with buckwheat, *kalai*, soy bean and *kodo* as secondary crops. The outturn of maize is higher on the unterraced plot, so no advantage can be claimed for terracing.

It is intersting to note that the secondary crops *kodo*, *kalai* and soy bean gave higher yields on the terraced acre, while buckwheat and *kodo* gave a greater yield on the unterraced plot, *i.e.*, the larger the crop of maize the poorer the following crop and *vice versâ*.

The following are the details of cost of cultivation of 1 acre of maize :—

1914.			Rs. a. p.
January	28—29	Ploughing ...	3 2 0
February	11	Manure ...	15 10 0
„	20	Breaking clods ...	1 0 0
March	18	Sowing seed ...	1 9 0
		25 seers seed ...	2 5 6
		Breaking clods ...	0 8 0
April	22	Thinning ...	0 6 0
May	3	Hoeing ...	1 5 6
June	5	Ditto ...	2 8 0
August	26—27	Harvesting ...	5 6 0
December	6	Threshing small cobs ...	0 2 0
February	17	Hulling ...	3 12 0
			37 10 0

Experiments conducted on the manuring of maize with bones and superphosphates; but as the plots suffered damage by pigs, it is useless including the results in this report.

Oryza Sativa—Winter rice—Dhan—Transplanted rice.—Owing to the proximity of this farm to the hill ridge a very limited space is left to act as collecting ground for water, and the crop in consequence is almost entirely dependent on rainfall during these months to ensure the continuous supply of water so essential for its growth. The seed-beds are sown by the end of May; transplanting is commenced by the end of June.

The following table gives the area, outturns and yields per acre of each variety grown on this farm :—

Rice in 1913.

	Varieties.	Area.	Outturn.	Yield per acre.
		Acres	Mds. s.	Mds.
	Touli	2·04	33 25	16¾
	Ramtulasi	1·19	15 30	13
	Touli	2·57	42 35	16⅔
	Ratomarsi	2·33	28 5	12
Variety.	Touli	¼	2 22	10¼
	Danasi	¼	3 15	13½
	Mansaura	¼	3 15	13½
	Ratomarsi	¼	2 12	9¼
	Ramtulasi	¼	2 8	8¾
	Tommure	¼	2 58	11¾
Manure	Danasi (nil)	⅓	3 35	11⅓
	Do. (g. m. soy bean)	⅓	3 0	9
	Do. (50 maunds cowdung).	⅓	3 5	9⅔

(1) Touli *dhan* gives large whitish grain of rice—Pure.
(2) Krishnabhog, greyish (dirty) white grains of rice—Pure.
(3) Danasi, large white-grained rice—10 per cent. red.
(4) Mansara, a black-grained *dhan*, gives large white grains of rice—Pure.
(5) Ratomarsi, blackish *dhan*, gives large white rice—Pure.
(6) Ramtulasi, a yellowish white *dhan*, gives whitish grained rice—Pure.

Taking everything into consideration touli is the best rice for this farm. Seed selection should be carried out on this variety and the remainder may be given up.

The following table gives the figures for 1911, 1912 and 1913:—

Variety.	Outturn per acre.				
	1911-12.		1912-13.		1913-14.
	Grain.	Straw.	Grain.	Straw.	Grain.
	Mds. s.	Mds. s.	Mds. s.	Mds. s.	Mds. s.
Touli (hill rice)	14 16	44 28	14 35	26 0	10 20
Danasi ,,	15 8	35 28	11 39	27 12	13 20
Krishnabhog ,,	15 4	60 36	8 0	50 32	...
Mansaura ,,	11 32	39 24	13 25	22 16	13 20
Ratomarsi ,,	17 0	39 8	13 6	20 32	9 10
Ramtulasi ,,	19 8	53 20	7 16	35 28	8 30

The figures of 1912 and 1913 show a considerable decrease in outturn from those of 1911-12, except in the case of touli, which year after year has shown marked consistency in these tests, irrespective of climatic conditions.

So far as manures for rice are concerned, there is nothing of interest to publish. The unmanured plots continue to yield as heavy crops as those manured with 50 maunds cowdung or those green manured with *dhaincha* or soy beans.

To show details of cultivation and dates of various operations the following report from the cultivation book is appended :—

AREA, 2·04 ACRES.

Touli (50 maunds manure).

Date. 1913.	Particulars.	Cost. Rs. A. P.
May 15th ...	Ploughing seed-bed	0 10 0
„ 16th ...	Cutting *ali*	0 12 0
	Preparing seed-bed and sowing seed	0 12 0
	Two maunds two seers seed ...	6 6 0
June 20th ...	Ploughing	6 6 0
July 1st ...	Cutting *ali*	7 0 0
„ 3rd ...	Carrying, spreading 100 maunds manure	6 6 0
„ 19th ...	Ploughing	5 10 0
	Building *alis*	4 1 0
„ 23rd ...	Levelling with dandy	2 8 0
	„ with hands	3 4 0
	Transplanting	7 5 0
Sept. 20th ...	Weeding	14 10 0
Nov. 14th ...	Cutting	8 10 0
Dec. 6th ...	Carrying	5 6 0
Jan. 3rd ...	Thrashing	8 0 0
	Watering the whole period ...	3 0 0
	Total cost of 2·04 acres ...	95 10 6
	Cost per acre ...	47 0 0

Eleusine Coracana—Millet—Marwa—Kodo.—This crop grows in rotation with maize and is transplanted amongst the maize crop in the end of July, so that when the maize crop is harvested in August the *kodo* crop covers the land.

The following table shows the average outturns per acre from 1909 to 1913 :—

	Mds.
1909	26
1910	19¾
1911	22¾
1912	23½
1913	27½

while the following table gives details of cultivation and cost per acre :—

Kodo, 1 acre.

			Rs. A.	Rs. A.
Seed-bed—				
January	7—21	Ploughing	0 4	
May	16	Ditto	0 2	
„	17	Manure	2 8	
		Breaking clods ...	0 6	
		12 seers seed ...	1 2	
				4 6
In maize crop—				
July	26—30	Weeding	4 12	
		Digging	2 14	
		Transplanting ...	17 8	
August	23	Cutting maize stalks ...	1 10	Gr. 26¼ mds. St. 5 „
Sept.	26, 27	Weeding ...	8 4	
Nov.	25—29	Cutting, carrying ...	12 0	
Jan.	31	Threshing ..	6 4	
				53 4
				57 10

Fagopyrum Esculentum—Buckwheat—Phaphar.—This crop is grown after maize. Seed is sown in September and the crop is ready for harvesting at the beginning of December. A variety test has been made on Japanese and local buckwheat with the following results:—

	Variety.	Area.	Yield per acre.	
			Grain.	Straw.
		Acre.	Mds. s.	Mds. s.
1911.	Japanese buckwheat	·5	1 30	2 16
	Buckwheat (local) ...	·5	12 24	50 10
1912.	Japanese buckwheat	·5	9 0	12 26
	Buckwheat (local)	·5	9 24	27 0
1913.	Japanese buckwheat	·5	9 15	10 10
	Buckwheat (local)	·5	12 0	55 0

From these figures there is no reason to change the local variety.

The following shows the cost and details of cultivation of this crop:—

Buckwheat, 1 acre after maize.

			Rs. a.		
Sept.	1	Cutting bhutta stalk and weeds ...	2 8		
„	2-3	Ploughing	3 7	Mds.	Rs.
„	8	Sowing seed	2 5	Gr. 12	30
				St. 55 (bedding).	
		1 md. 5 seers	2 13		
				Rs.	a.
Dec.	4—8	Cutting, carrying and threshing ...	2 12	13	13

Triticum Sativum—Wheat—Gehum—Sown in October-November, it ripens in February An outturn of 5½ maunds has been obtained.

The cost of cultivation is Rs. 25-6 per acre.

Hordeum Hexastichum—Barley—Jau.—In previous years this crop gave very poor outturns and it is pleasing to record a great improvement. The yield of 1911-12 was 4 maunds 32 seers grain per acre, whereas in 1912-13 outturn went up to 14 maunds grain and 20 maunds straw and in 1913-14 an outturn of 16 maunds per acre was obtained from ¼ of an acre.

The cost of cultivation was Rs. 34-2.

Unirrigated rice (Aus dhan or Ghaiya).—This crop is sown broadcast on the slopes. One quarter acre was cultivated in 1912 and the outturn was 22 maunds grain and 161 maunds straw per acre; the cost of cultivation amounts to Rs. 47-12, value of yield Rs. 65-1, leaving a profit of Rs. 17-5 per acre. In 1913 on half an acre, an outturn of 32½ maunds grain plus 149 maunds straw was obtained at an expenditure of Rs. 18-7.

Leguminous.—The following crops belonging to this order are grown in the district and on this farm:—

Botanical name.	English name.	Nepalese name.	Number of varieties.	Remarks.
Glycine hispida ...	Soy bean ...	Bhatmas ...	6	Lepcha name Selliyang.
Phaseolus mungo ...	Kalai ...	Dal ...	3	
Ditto radiatus ...	Do.	Mungi dal	1	
Ditto calcaratus ...	...	Mashyem ...	3	
Ditto sublobatus ...	...	Ditto ..	1	This species is often called guraus.
Dolichos biflorus ...	...	Gahat ...	2	

Soy bean.—The following varieties were grown on the farm this year:—

Variety.	Area.	Outturn per acre. 1912-13. Grain.	Straw.	Outturn per acre. 1913-14. Grain.	Straw.	Remarks.
		Mds.	Mds.	Mds.	Mds.	
Nepali bhatmas ...	·5	14	10	16½	14	Whole season crop grows alone.
Barmeli	·5	5	7	13	20	
Green ...	·5	4½	6	13	20	Grow in rotation with maize.
Chocolate	·5	9½	16	14½	19½	
Black ...	·5	6¼	13	11¼	17¼	

The first two varieties in addition to the white, which is not grown on this farm, belong to the erect growing varieties, while the last three mentioned are of trailing habits.

All these leguminous crops can be grown in rotation with maize. However Nepali soy beans produce very little when grown in the maize, but when grown alone they yield heavily. They cannot, however, compete with maize. The cost of cultivation of these crops is Rs. 25 per acre, except Nepali soy beans grown in the open which comes to Rs. 57-7 per acre.

Jute—Corchorus Capsularis.—This crop was tried for three years, but an outturn of 2½ maunds per acre was the best yield we could obtain.

Saccharum officinarum—Sugarcane.—This crop takes 18 months to come to maturity on this hillside as compared with 10 months down on the plains. It is profitable to grow a small area for chewing purposes.

The following table shows the number of trees received and the number living at the end of each year after planting:—

Kind of trees.	Number imported.	1910.	1911.	1912.	1913.
Apple	12	8	5	2	2
Apricot	12	5	2	2	2
Nectarine	6	1	1	...	...
Plum	24	11	6	4	4
Cherry	18	7	7	6	6
Pear	18	4	3	3	1
Peach ...	6	...	...	...	...
Walnut	6	6	6	6	6
Fig	6	5	2	2	2
Wine	6	3	3	3	2
Gooseberry	12	...	...	...	...
Currant	12	...	...	...	...
Raspberry	20	...	...	...	...
Total	158	50	35	28	25

Fruit-trees.—The rainfall of this hillside and the site seem to be unfavourable to the following fruit-trees:—Apple, apricot, nectarine, plum, cherry, pear, peaches, walnuts, fig, vine, gooseberry, currant and raspberry. Oranges, lemon and papya trees and plantains thrive on this hillside.

Pine apples.—Suckers of the Queen variety were obtained from the Kalimpong Government Fruit Gardens in August 1908 and planted on ·15 acre. The produce yielded to date is as follows:—

Year.	Number of pines.	Value. Rs. A. P.
1909	36	2 4 0
1910	340	45 1 6
1911	476	85 5 0
1912	719	112 5 6
1913	894	139 11 0

The pines were sold at an average price of 2½ annas each. Half an acre of land near the farm buildings has been planted out with this crop. This pine is much sought after by local cultivators and a number of suckers have been supplied.

8. *Receipts and expenditure*.—A copy of the balance sheet for the year ending 31st March 1914 is here given:—

RECEIPTS.

	Rs. A. P.
Balance from 1912	965 14 1
Government grant	5,00 0 0
Farm produce	3,287 8 3
Miscellaneous receipts	151 9 0
Bullocks	110 0 0
Total ...	9,514 15 4

EXPENDITURE.

	Rs. A. P.	Rs. A. P.
Labour	2,065 8 0	
Superintendence ...	2,866 0 0	
		4,931 8 0
Miscellaneous, seeds, manures, postage, repairs		684 0 0
Capital outlay		225 2 6
Bullocks		124 0 0
Half-share Homes		1,662 8 0
Balance in hand carried forward, 1914		1,887 12 10
Total ...		9,514 15 4

9. *Acknowledgment and Training*.—We have to thank Mr. Green of Mongsong, for kindly valuing the farm stock in March 1914. No one was trained at this farm during the year.

10. *Management*.—The land for the farm was bought by the St. Andrew's Colonial Homes and is subject to an annual rental of Rs. 70-1.

The farm is managed by the St. Andrew's Colonial Homes. The Bengal Government gives a grant of Rs. 5,000 plus half the sale-proceeds per annum. Mr. J. Wilson was in charge of the farm throughout the year until the beginning of March 1914, when he resigned. All credit for the good work done is due to him and this report is compiled from his records.

The programme of work for this farm is drawn up in consultation with the Agricultural Department, Bengal.

Mr. Smith, Deputy Director of Agriculture, Bengal, inspected the farm in June and September 1913. Mr. Blackwood made an inspection in April 1914.

F. SMITH,
Deputy Director of Agriculture, Bengal.

CROPPING SCHEME FOR THE KALIMPONG DEMONSTRATION FARM FOR 1914-15.

KALIMPONG DEMONSTRATION FARM.

Seed selection on maize, winter rice, buckwheat and kodo—

	Acre.	
Maize	17½	Variety experiment. Rotation ditto.
Rice	10½	Variety ditto. Manurial ditto.
Buckwheat	2	Variety. Rotation.
Kodo	2	Ditto.

Testing what *rabi* crops are economical.

Terracing *versus* non-terracing on hill side.

Pine apples, fruit trees.—To find out which fruit trees can be grown economically on this hillside.

REPORT OF THE KHAS TAHSILDAR, CHITTAGONG, ON THE WORK AT THE MODEL FARM, CHITTAGONG, DURING THE YEAR ENDING 30TH JUNE 1914.

THE Model Farm was originally started with an area of 48 acres of land, of which 8 acres only; covered by three small but continuous hills, were reserved for Governmen experiment, the rest having been temporarily leased out for a term of five years with late retired Sub-Deputy Collector Maulvi Amjad Ali on condition that the lessee must grow some crop each year at least on 6 acres of land under the demonstration of the Director of Agriculture. The term of his lease expired on the 31st December last, and the entire original area attached to the farm thus came into *khas* possession of the Government. The land in the hands of Maulvi Amjad Ali seems to have been totally neglected. The major portion of the area leased out to him was left untouched and no improvement was attempted, so it was proposed that the lease should not be renewed after the expiry of its term. In the meantime a scheme of starting a cattle-breeding and dairy farm with the area attached to the Model Farm and also some Government *noabad* land leased out by the Khas Mahal Department to Mr. D. Datta, now Agricultural Supervisor, Chittagong Division, was contemplated by the Director of Agriculture. During his last visit to Chittagong, the Director of Agriculture personally saw the land and expressed his desire to utilise the Model Farm land for the purpose of the scheme mentioned above.

2. Experiment on soybean was made on an acre last year. Out of the quantity of seeds received, 5 seers (10 lbs.) were distributed gratis to the public for experiment and 10 seers (20 lbs.) have recently been sent to the Commissioner of the Orissa Division at his request, and the balance (3 maunds, 10 seers = 260 lbs.) is still in the stock as it could not be disposed of either by sale or by distribution owing to lack of interest of the people of the locality in the cultivation of the same. The Director of Agriculture was also asked if he required any quantity : his reply was in the negative. Taking all these circumstances into consideration and awaiting the final proposal of the Director of Agriculture on the utilization of the area, no further experiment on soybean was taken up.

3. The farm has a fruit garden consisting of jack, mango, *lichi* banana, guava, orange and pineapple. The outturn of mango was good, but that of *lichi* was comparatively poor.

4. The building which was erected for the residence of the Farm Superintendent was so long partly utilised by the town tahsil muharrir as his office and partly by Mr. D. Datta as his residence and dairy house with the Collector's permission. The tahsil muharrir's office has recently been removed to the headquarters, and Mr. Datta having accepted an appointment in the Agricultural Department, has wound up his business there. A guard has been kept to look after the building and the farm property under my direct supervision. The main building is badly in need of repairs. Pending the decision of the question about the retention of the Model Farm, the repair work has not yet been taken up.

5. On expiry of the term of the lease granted to the late Maulvi Amjad Ali, the Director of Agriculture was asked for instructions about the subletting of the land again, whereupon he requested the Collector in his letter No. 1647, dated the 10th March 1914, not to let it out on lease to anybody for more than one year pending the final result of the scheme referred to above. The hasila and culturable khila portion of the area, measuring half of the quantity formerly leased out to the Maulvi, has accordingly been let out to different persons who are *bona-fide* cultivators for a year only from the 1st May 1914 to the 30th April 1915, on a total rent of Rs. 124-12 against Rs. 107 odd which used to be paid by the Maulvi for the entire lot. The remaining portion of the farm land has been left *khas*. Seven and a half gandas (nearly $\frac{1}{10}$th acre) of land was selected for experiment in two species of paddy, viz., *Badshabhog* and *Balambeti*, supplied by the Agricultural Department, and the outturn was 2 maunds, 12 seers (184 lbs.).

6. The total cost incurred during the year under report in the upkeep of the garden attached to the farm, maintenance of farm bullocks, repairs of farm out-houses, and experimental cultivation of *Badshabhog* and *Balambeti* paddy was Rs. 100 against Rs. 213 in the preceding year, and the total receipt by sale of the garden products was Rs. 140-13 against Rs. 172-10-3 of the previous year. It may be noted here that out of the three bullocks of the farm, one died a natural death, being extremely old and some *lichi* trees were destroyed by fire which caught the thatching grass of the adjoining hill in possession of a private person.

U. CH. BARUA,

Sadar Khas Tahsildar.

The 16th July 1914.

SEED-STORE AT SIBPUR.

This store was run in connection with my office. Apart from bonemeal and potatoes, which are mixed up to a certain extent with the accounts of the special grant for

demonstration work in the Province, the following seeds, manures and implements were distributed from Sibpur during the year :—

Seeds	...	392 maunds (14½ tons), of which 176 maunds (6½ tons) dhaincha and 41 maunds (1½ tons) paddy.
Manures	...	823 maunds (30½ tons), of which 343½ maunds (12½ tons) bonemeal and 421½ maunds (15½ tons) castor cake.
Implements	...	15

Of the seeds, a large quantity of *dhaincha* was sent to Madras, while of the manures, only bonemeal was distributed to cultivators, the remainder being sent to the Government farms in Bengal.

The following are receipts and expenditure for April-March 1913-14 :—

Expenditure—

	Rs. A. P.	Rs. A. P.
Seeds	1,849 13 0	
Implements	634 2 0	
Manures	1,797 2 0	
Contingencies	616 11 0	
	4,897 12 0	
Establishment	899 10 3	
Total ...	5,797 6 3	

Receipts—

	Rs. A. P.	Rs. A. P.
Seeds	1,406 10 0	
Implements	64 13 0	
Manures	696 6 0	
		2,167 13 0
Bills outstanding on 31st March 1914—		
Seeds	414 2 0	
Implements*	18 8 0	
Manures†	275 2 9	
		707 12 9
GRAND TOTAL		2,875 9 9

* The difference being made up by implements supplied to farms.

† The difference being stock in hand.

In addition to the above, potatoes to the value of Rs. 7,187-4-6 were distributed, while receipts of Rs. 2,435-9-3 were received, leaving a deficit of Rs. 4,751-11-3 for this item alone. We hope to recover most of this deficit, but on 1st April 1914 the money had not been received.

So far as bonemeal is concerned, much more has been distributed than shown above, but the extra amount has not gone through the Sibpur seed-store.

F. SMITH,

Deputy Director of Agriculture.

REPORT OF WORK DONE BY THE FIBRE EXPERT TO THE GOVERNMENT OF BENGAL DURING THE YEAR ENDING 30TH JUNE 1914.

Manures for jute on acid red soils in Bengal.—The manurial experiments commenced in 1911, which were mentioned in last year's report, have been continued and the results of another season's work are now available. These results confirm those of the previous years in a very convincing manner. The lime applied in 1912 gave in that year an increase of 4 maunds (320 lbs.) per acre of fibre over a similar number of check plots (ten) which were unlimed. In 1913 the same plots, without any further application of lime, yielded 4·8 maunds (384 lbs.) per acre more fibre than the unlimed ones, and the crops on these plots in the present year (1914) show that the balance in favour of the lime plots will be just as great as in either of the previous years.

In addition to the application of lime, the effect of various forms of phosphoric acid is being investigated, on both limed and unlimed land. There seems to be no doubt that the action of phosphates benefits jute to a considerable extent; and there is at least some indication that their application actually tends to increase the percentage fibre-content of the plant—a most important matter. There are also indications of their action in other directions, but further work is required not only on these points, but also as regards the form of phosphates whose application is most advantageous. At the suggestion of Mr. Meggitt flour phosphate is included among the different kinds of phosphate under trial.

It is important to remember, in gauging the value of lime and phosphate for this land (red laterite), that their action exerts itself in both seasons—*Kharif* and *Rabi*. In the case of mustard the effect of phosphates and lime is almost magical, for their application causes the difference between a really good crop and no crop at all.

While, therefore, there is still plenty of room for further investigation, the demonstration, on the red laterite soils of the Bahrind and Madhupur jungle tracts, of the effect of lime and phosphates (bonemeal) on jute as a *Kharif* crop and mustard as a cold weather crop is now amply justified. The following figures show approximately the money value of the increased yields obtained in the three years during which the experiment has been in operation :—

	Rs.	A.		Rs.	A.
Increased annual yield of jute due to use of lime 4 maunds (320 lbs.) per acre per annum at Rs. 8 per maund	320		Value of lime applied ...	20	12
Increased annual yield of mustard also due to bone and lime 3 maunds (240 lbs.) per acre per annum at Rs. 5-1-3	16	0	Value of phosphates	26	4
			Total cost of additional manures applied to limed plots in three years	47	0
			Average annual cost of manures	15	11
			Increased annual net return due to application of bone and lime ...	32	5
Total ...	48	0	Total ...	48	0

In other words, in th reeyears an aggregate expenditure of Rs. 47 per acre on lime and bone has *increased* the aggregate yield of jute and mustard on the Dacca plots to the value of no less than Rs. 144, representing an increased *net* return of Rs. 97 per acre. It should be noted that the price of jute has been taken at Rs. 8, which may be regarded as more nearly an average price than the values which have recently prevailed.

It is hoped in the course of the next season to test these results on an extensive scale in red laterite soil tracts.

Selection work on jute varieties.—For several years past a close study has been made of a large number of races of jute (*C. Capsularis*) which are under cultivation in different parts of the jute-growing tracts of Bengal, Bihar and Orissa, and Assam, and a considerable amount of information regarding their characteristics has been accumulated. The main object of this somewhat laborious work was to examine each race as far as possible under even conditions in regard to—

(*a*) its yielding power;

(*b*) the quality of its fibre;

(*c*) any other characteristics which might add to or detract from its value in cultivation.

From the crop yielded by the original seed obtained, typical plants were selected whose seed was sown in the next season. In this way pure cultures were obtained. [*N.B.*—It has already been proved that jute is normally self-fertilized—*vide Memoirs of the Department of Agriculture in India*, Botanical Series, Volume IV, No. 4], and several of these cultures which showed the heaviest yielding power in conjunction with other desirable characteristics have now been multiplied sufficiently to admit of production on a large scale for distribution. One of the best of these races of *C. Capsularis* has been grown for seed this year on every farm in Bengal, as well as in Bihar. It is not possible to give exact figures at present, but it is fairly certain that sufficient of this seed will be available in the next season (1915) to sow anything between a minimum area of 300 acres and a possible maximum over 1,000 acres. It is proposed to utilize a portion of this seed for the preliminary stocking of seed farms. It has been decided that there is sufficient land available on the present farms to satisfy immediate necessities; but a larger demand for the improved seed is anticipated and, in view of this contingency, the establishment of fresh seed farms has already been discussed.

Desi jute (*C. Olitorius*) has also received attention but, partly owing to the unsuitability of the Dacca Farm land for the cultivation of *C. Olitorius*, there is at present no pure line seed which is available in sufficient quantity for distribution on a large scale. A good deal of attention is now being given to this point.

It is early yet to claim that these pure cultures are absolutely better than any other race in cultivation in Bengal—this may be the fact, but in any case the work will proceed with a view to further improvement, using the pure cultures already available as standards. In the meantime it can be accepted with confidence that these latter races are—

(*a*) Heavy (if not the heaviest) yielders of fibre.

(*b*) Their fibre as shown by laboratory tests is of very good quality.

(*c*) They are hardy races which are capable of withstanding a variety of conditions.

The Agricultural Department has now a large number of men whose duties lie in the collection of information in connection with the jute forecast, and these men are being utilized for the obtaining of typical samples of good jutes from their respective districts. These new samples will all be examined and tested against our own pure varieties in the next season. At the same time a number of test plots will be grown in different districts, a prominent local jute being sown in the check plot. A great deal of information will be gained in this way which cannot but result in the gaining of much knowledge which will be of direct benefit not only to the cultivator but to the jute trade in general. In this connection it is worth while for the jute trade to consider how far it can help, through its mufassal agencies, in work like that which has just been described. The classification of races, which was a laborious investigation of a purely scientific nature, is now approaching completion, and the practical application of its results within a reasonable time will depend largely on the number and enthusiasm of those who are engaged in the work. It would seem that mufassal agencies of jute firms could render peculiarly valuable assistance in this direction, and we commend a serious consideration of the matter to that portion of the commercial community who are engaged in the jute trade and who, after all, are the ones most interested in the development of the cultivation of the plant along sound scientific lines.

Agaves.—As mentioned in last year's report, experiments to test the relative rate of growth of bulbils and suckers have been commenced, and several hundred bulbils and suckers respectively collected from various sources have been planted out during the year under review. It is proposed also to utilize this material as a basis for selection with reference to the time of poling and percentage of fibre as well as for experiments with manures.

The specimens in the collection of agaves have been obtained from a very wide area, and we are glad to recognize our indebtedness in this connection to the following:—The Superintendent of the Royal Botanical Gardens, Sibpur, Calcutta; the Superintendents of the Botanical Gardens at Bangalore, Lucknow and Lahore; also to the Fibre Expert to the Government of the Philippines and to Messrs. Wigglesworth & Co., London.

Other Fibres.

Sida and Urena Lobata.—Four bales of *Sida* (about 13¾ maunds = ½ ton) and of *Urena Lobata* which were grown on the Dacca Farm in the season 1912 were, through the kindness of the Director, Imperial Institute, and of Messrs. Wigglesworth, sold in the open market, London, during the year under review and realized a net price of Rs. 215-10 (after deduction of expenses and commission, but not freightage), the selling price being £36 per ton, or about Rs. 19-8 per maund, which was about £1 per ton higher than "first native marks" of jute on the same day. This price is of course considerably higher than the average; but, on the other hand, owing to unavoidable circumstances, none of the fibre was well prepared. Given well-prepared fibre, it seems reasonably certain that *Sida* would be worth from 20 per cent. to 30 per cent. more than ordinary jute; but its yield per acre is 30 per cent. less, and although it is easier to ret, it is rather more expensive to strip. *Urena Lobata* is a heavier yielder than *Sida* and it has the unique advantage amongst fibre crops of the jute class of being capable of very successful cultivation as a ratoon crop. On this account alone its possibilities are worth further investigation.

G. P. Hector,

for *Fibre Expert, Bengal, Dacca.*

REPORT OF WORK DONE BY THE AGRICULTURAL CHEMIST TO THE GOVERNMENT OF BENGAL, DACCA, DURING THE YEAR ENDING 30TH JUNE 1914.

I.—Charge of Office.

Mr. Meggitt held charge of the office till 7th January 1914, when, on my transfer to Bengal, I took over charge from him and he proceeded to Assam as Agricultural Chemist.

II.—Leave.

The Agricultural Chemist has taken no leave in the year under report.

III.—Tours.

Mr. Meggitt made the following tours :—

To Jorhat in July.—To inspect sugar-cane plots and other experimental areas, and to take soil samples, and further, to consult the Executive Engineer with reference to the fittings of the new laboratory.

To Calcutta in July.—In connection with gas and other fittings to the new Jorhat laboratories.

To Brahmanbaria in August.—To inspect the site for the proposed new jute farm.

To Jorhat in October.—To plant sugarcane, apply certain manures, and take soil samples.

To Coimbatore (Madras) in December.—To attend the meetings of the Board of Agriculture.

I have made the following tours :

To Jessore district and Calcutta in February.—The former place was visited in connection with date-sugar investigations, and the latter mainly to inspect some experimental Java cane at Belur.

To Calcutta, Konnagar, Chinsura and Burdwan in April.—At the two latter places the Government farms were inspected and soil samples taken. In Calcutta and Konnagar I was in consultation with the Assistant Commissioner of Excise with reference to various fermentation matters. In addition, stores were being purchased for the laboratory.

To Rangpur in April.—To visit the farms there and at Burirhat and to take soil samples.

To Rajshahi in June.—To visit the Government farm and to take soil samples, and also to Jessore district to take soil samples and to obtain date-palm seeds from certain selected trees.

In all Mr. Meggitt was on tour for 50 days, whilst I was also on tour for 31 days—a total of 81 days for the year under report.

IV.—Work performed.

Full details of the work performed by Mr. Meggitt up till the time of his transfer to Assam cannot be furnished by me. Mr Meggitt is at present on furlough, and it is practically impossible for a new-comer to report on his predecessor's special lines of work.

As far as I am able to judge, Mr. Meggitt has had to give much of his time to Assam in connection with the fitting up of the new laboratories at Jorhat, and in connection with certain special problems he has been investigating there.

These problems include :—

(1) Cane-sugar experiments at Kamrup and Jorhat.

(2) Liming experiments at Jorhat.—Mr. Meggitt has apparently obtained marked effects on certain soils by the use of lime, and has applied various amounts of lime at varying intervals in order to determine which system of liming gives the best results.

(3) His green-manuring experiments have been continued.

(4) I understand that he has isolated from some acid soils in Assam a substance which is highly toxic to certain plants.

At Dacca, Mr. Meggitt has continued his manurial experiments. The results of these will appear in the annual report of the Dacca Farm.

My own work for the year under report may be summarised as follows :—

(1) *Sugarcane.*—Five varieties of sugar-cane were grown for trials on the Dacca Farm with the object of finding out the most suitable varieties for distribution to cultivators. The main results of these experiments are summarised by me in the annual report of the Dacca Farm.

Apart from the direct results obtained in the work, a large amount of work was carried out with the object of comparing different methods of sampling the cane, and further, to find out the variation likely to occur in the results obtained from plots of the same cane, treated similarly in every respect. It may be remarked here that certain methods of sampling sugarcane introduce large errors into the results. The results obtained above show that the method of sampling recommended by Dr. Leather, Imperial Agricultural Chemist, gives extremely accurate results. This method will be followed in future years, and will result in much saving of time in the chemical control of sugarcane experiments. The results have been sent in for publication as a Memoir of the Imperial Department of Agriculture in India, Chemical Series.

(2) *Palm-sugar investigations: A.—Field work.*—The Tarpur Sugar Works, Limited, have shown during the past season, that it is possible to produce white sugar

direct from the juice of the wild date-palm. I visited the factory, which is under the management of Mr. N. Dutt, whilst it was working. I obtained samples of each of their products. These were of very fine quality. The products found a ready sale. It may be remarked here that the manufacture of this white sugar is extremely simple, the juice requiring no bleaching or clarification.

Date-palm seeds were obtained from trees in the Jessore district, some of which are only moderate yielders and one of which was a very heavy yielder. Rather more than 300 of these seeds have been sown on about an acre of land on the Dacca Farm. The weight of each seed was ascertained before sowing. The experiment may be expected to provide information as to whether seeds from a heavy-yielding tree produce trees of high-yielding capacity and also whether heavy seeds give better trees than lighter ones.

B.—Laboratory work.—Experiments are in progress in order to elucidate the mechanism of the production of the sugar in palm trees. The work, which should yield very interesting results, is not sufficiently far advanced to describe here.

(3) *Plants used for green-manuring.*—A detailed study of certain leguminous plants used for green-manuring has been commenced. *Saun* hemp and *dhaincha* are at present under investigation. The proportion of stem, leaves, root, and root nodules is being determined at various stages of growth, and a careful record will be kept of the amount of nitrogen in each of the above portions of the plant. In addition the chemical nature of the nitrogen compounds stored up in the nodules is under investigation. The effect of various manurial treatments on nodule growth is being determined, the acid Dacca soil being especially studied in this connection.

These investigations are not sufficiently far advanced to allow of a summation of results.

(4) *Soil survey.*—Numerous samples of soil have been collected from various parts of Bengal. It is proposed to collect and analyse samples of soil from as many places in Bengal as possible, and at the same time to collect information as to the crop grown on these soils. As this work progresses, we shall gradually be able to define the boundaries of the different classes of soil which exist in the province. Work of this nature should give interesting results which should be very useful in making manurial or cropping recommendations for a given district.

(5) *Miscellaneous investigations : A.—Work on Indian seeds.*—A study of the enzymes present in various Indian seeds has been taken up. The sword-bean (*Canavalia ensiformis*) I have shown to contain a ferment which can rapidly change urea into ammonium salts. The results have been communicated by me in a paper to the London *Biochemical Journal.* It is quite possible that the powdered seed might find application to sewage treatment. In any case it will be of importance to physiological chemists, as by its use one may accurately and rapidly estimate the proportion of urea in urine or blood.

B.—With a view to determining the composition of many varieties of rice for work in collaboration with the Economic Botanist, some time has been spent in working at a recent method for starch estimations. The work promises to lead shortly to a successful issue.

C.—Soil denudation.—Certain high and low areas on the Rangpur demonstration farm have been sampled. These will be sampled annually before and after the rains, in order to determine the amount of fine soil washed from high to low areas during the heavy rains. Similar work is to be carried out on the Dacca Farm. The work is in connection with an enquiry on the subject instituted by the Agricultural Adviser to the Government of India, which in its turn arose out of certain observations by the Imperial Economic Botanist at Pusa.

(6) *Routine work.*—Various samples of soil, manure and feeding stuffs have been received for analysis. Most of these were received from the various Government farms.

Manures.—One sample of each of the manures was analysed—cattle manures, castormeal, bonemeal sweepings, superphosphate.

Food-stuffs.—The following were analysed :—

No. of samples.	Food-stuffs.
3	Bran.
31	Mati Kalai.
45	Rice.
1	Pulse Bhusa.

V.—PUBLICATIONS.

The following publications have emanated from the laboratory during the year under report :—

(1) "Studies of an Acid Soil in Assam," by A. A. Meggitt, Memoir, Imperial Department of Agriculture, Chemical Series, Volume III. No. IX. (In the press.)

(2) "The use of Sweet *Jowar* as a source of Commercial Sugar or as Fodder, and the variation in composition of the crop during growth," by H. E. Annett. Pusa Bulletin No. 40.

(3) " A Comparison of various methods of sampling Sugarcane and the experimental error in field trials with Sugarcane," by H. E. Annett. Memoir. Imperial Department of Agriculture, Chemical Series. (In the press.)

(4) " Some Aspects of the Danish Dairy Industry," by H. E. Annett. *Agricultural Journal of India*, July, 1914.

(5) "The Urease content of certain Indian seeds," by H. E. Annett. *Biochemical Journal*, London.

(6) " Palms as a Commercial source of Sugar," by H. E. Annett. Paper communicated to and read at the International Congress of Tropical Agriculture, London, June 1914.

H. E. ANNETT,

Agricultural Chemist to the Government of Bengal, Dacca.

REPORT OF WORK DONE BY THE ECONOMIC BOTANIST TO THE GOVERNMENT OF BENGAL DURING THE YEAR ENDING 30TH JUNE 1914

Rice.—The work on rice has been continued on the lines indicated in previous reports. In last years's report it was mentioned that cross-fertilisation in rice had been proved to be of fairly frequent occurrence. This has been amply confirmed during the past year. Practically all variant plants, amounting to over 30 found in the pure line plots of 1912 proved in season 1913-14 to be natural hybrids, and at least an equal number have been found in the 1913 plots. Some of these, it is hoped, may prove valuable. Work on hybridisation with a view to study the inheritance of some of the chief differentiating characters has been continued, and the F_2 generation of some of these crosses is being grown this season. The characters of over 200 types of transplanted *Aman* paddy have now been studied in detail for three seasons and the best so far isolated are being tested on a field scale. Six were grown on the farm last year and the areas and outturns are given below :—

NAME OF PADDY.	Actual area in bighas.	Outturn per acre in Maunds and seers.
Indursail	3·04 (1 acre)	25·26- 6 (2,052 lbs.)
Pykerbar	3·48 (1·16 „)	20·39 3 (1,678 „)
Lakshmibilas ...	1·81 (·60 „)	18·25-10 (1,490 „)
Lambachikan ...	3·04 (1 „)	18·25- 8 (1,490 „)
Kandulia	2·14 (·71 „)	18·4- 6 (1,448 „)
Lohadung	2·78 (·92 „)	17·5- 7 (1,370 „)

The figures are not so high as was anticipated ; but the season was a poor one, and several of the plots were badly damaged both by floods and insects. *Indursail*, which was expected to stand first, is again being tested on a much larger scale this year at Dacca, Chinsura, Rajshahi and Rangpur.

Work on similar lines to the above is being carried on with the *Aus* paddies also.

Seed-rate and specific gravity selection experiments.—As the samples of *Aus* seed paddy which the raiyat sows are normally very bad and the seed-rate used very high, it was thought that the specific gravity method of selection commonly used by the Japanese might prove a simple and economic method for the Bengal raiyat to adopt. Experimental plots to test this method were therefore started in 1913 and the results were sufficiently encouraging to justify their continuance, and they are being repeated this year in duplicate.

The method of experiment was briefly as follows. The area was divided into nine plots, each $\frac{1}{72}$th of an acre. On plots 1, 2, 3, ordinary unselected seed was sown at the common local seed-rate ; on plots 4, 5, 6, and 7, 8, 9 together the same quantity of seed was sown as on plots 1, 2, 3, but on plots 4, 5, 6, only those seeds were sown which sunk in salt solutions of varying strengths, while on plots 7, 8, 9, only those seeds were sown which floated.

Briefly stated, the results were as follows. Plots 4, 5, and 6 sown with heavy, selected seed at much smaller seed-rates than plots 1, 2, 3, yielded 8 maunds 12 seers (664 lbs.) against 6 maunds 35 seers, (550 lbs.) *i.e.*, 1 maund 17 seers (114 lbs.) more, or 5 maunds 28 seers (456 lbs.) more per acre than plots 1, 2, 3 ; while plots 4, 5, 6 and 7, 8 and 9, on which together only the same quantity of seed was sown as on plots 1, 2, 3 but spread over double the area, yielded 12 maunds 36 seers, (1032 lbs.) or almost double plots 1, 2, 3. The experiments are being repeated, and if this year's results bear out last year's, this method of selection, which is very simple and costs nothing, as even the salt used is recoverable, should be well worth introducing.

Ufra paddy disease.—Some experiments to test the effect of thorough ploughing and stubble-burning during the cold dry months were started in December 1912 in Bikrampur subdivision of Dacca district and in Chaumahuni in Noakhali district. The plots were sown in April-May 1913 and harvested in June-July and in December 1913. No

ufra disease appeared on the plots, though it had been prevalent in previous years; but it is not possible to tell whether this was due to the remedial measures or not. These experiments are open to the objection that the plots are out in the open, where it is not possible to control the water and prevent infection from outside. Hence results are likely to be inconclusive. At the instance of Dr. Butler, therefore, land has been acquired at Comilla, where, it is hoped, it may be possible to prevent outside infection, and it is proposed to carry on experiments in preventive measures over a number of years under as careful control as possible.

Other Work.

(1) *Oil-seeds.*—The work on these crops was continued. The work of isolating types Brassicas and Sesamums and of keeping them pure is complicated by the fact that both are to a large extent cross-fertilised.

(2) *Pulse crops.*—Work on varieties of *Phaseolus Mungo*, Linn. (*matikalai*) was continued, and some 15 distinct types have been isolated and are being grown. A few chemical analyses by the Agricultural Chemist point to the conclusion that there are considerable differences in the nitrogen content of these types, and this aspect will be taken up.

(3) *Chillies.*—The types isolated are being further studied and some cross-fertilisation work has been continued.

(4) *Green-manuring experiments.*—The experiments started in 1912 to test the possibility of growing a green-manure crop between the early paddy crop and the subsequent *Rabi* were continued and the results were again satisfactory. Cowpea was again the crop used. Three plots were sown with *Aus* paddy on April 11th—an early, medium and late variety, each plot 1 bigha (⅓ acre) in area. The early was reaped on July 17th and immediately sown with cowpea; the medium and late were reaped on July 30th and the latter plot also immediately sown with cowpea. On August 31st both plots of cowpea were ploughed in, the crop on the early paddy plot being six weeks old, that on the late, one month old. The extra fortnight made a big difference to the size of the cowpea crop, the first being an 8-10 anna, the latter about a 2-3 anna crop. On 11th October mustard was sown on all three plots and gave the following results :—

		Mds.	Srs.
1.	Early plot (8-10 anna crop, green manure) ...	1	12 (104 lbs.)
2.	Late plot (2-3 anna crop, green manure) ...	1	1 (82 „)
3.	Medium plot (no green manure)	0	39 (78 „)

The total yield of the plots, however, 3 maunds 12 seers, (264 lbs.) was very poor.

Fruit.—The fruit experiments were continued. Mangoes, *lichis*, guavas and custard apples are now in bearing, and all promise to do well. Citrus fruits have proved a failure and most have been removed from the area. The figs planted in Octeber 1912 have borne a few fruits of fair quality, but have not done so well as they should do. Two new lines, consisting of ten different varieties of Malda mangoes, were added to the area during the year under review.

G. P. Hector,

Economic Botanist, Bengal, Dacca.

REPORT OF THE IMPERIAL ENTOMOLOGIST.

Memorandum of Insect-pests reported from Bengal during the agricultural year, 1913-1914.

1. Letter dated 29th August 1913, from the Collector of Noakhali, sending specimens of insects which caused great damage to the *Aus* paddy in the western part of police-station Raipura.—The insect responsible for the damage was found on examination to be the rice Hispa (*Hispa œnescens*, Baly. *Armigera, ol.*) Some practical remedial measures were suggested to cope with the pest.

2. Letter dated 5th May 1914, from Mrs. Annie Drake, Serampore, sending specimens for identification of some cocoons of a moth, the caterpillars of which feed on the flowers of *Cœsalpinia pulcherrima.*—The moths on emergence from the cocoons were identified as *Epicephala chalybacma*, Mayr.

Apart from the above, all the necessary assistance was rendered from here to the Provincial Agricultural Department in the way of identifying insects, preparing and supplying the magic lantern slides, etc.

T. Bainbrigge Fletcher,

Imperial Entomologist.

REPORT OF THE IMPERIAL MYCOLOGIST.

THE following are the chief items of mycological interest to Bengal dealt within this laboratory during the year ending 30th June 1914.

(1) *Paddy disease.*—The disease known as *ufra* has been studied and accounts of the trouble published in English and Bengali (*vide* Bulletin No. 34). The work is being continued and an experiment is now in progress at Comilla to determine some simple remedy. Efforts are being made to map out the infected area in Bengal.

(2) *Sugarcane diseases.*—Two memoirs were published during the year and complete accounts of the important diseases of this crop in Bengal will be found in them (*vide* Memoirs, Department of Agriculture, India, Volume VI, Nos. 5 and 6). Work on the smut of sugarcane, caused by *Ustilago Saccharum*, is being continued.

(3) *Potato blight.*—It has been discovered that the fungus causing this disease will not live through the hot weather in the plains of India. It is hoped to continue this promising line of work.

(4) *Anthracnose of Betle pepper.*—The disease is under investigation, but at present there is nothing to add to my last report.

(5) *Palm diseases.*—Quite recently an outbreak of bud-rot of cocoanuts was reported at Ranaghat. The matter is still under observation. The disease of Areca palms which occurs in Khulna and Sylhet will be investigated during the coming year.

The usual assistance was given to officers of the department and the general public.

F. J. F. SHAW,

Offg. Imperial Mycologist.

ENTOMOLOGICAL REPORT FOR THE YEAR ENDING 30TH JUNE 1914.

Tours.—During the year the Entomological Collector visited the following places in connection with exhibitions and outbreaks of insect pests :—

July.—Kumerbhog (Dacca).—To spray ufra experimental paddy plots attacked by rice *Hispa* (*Hispa œnescens*, loc., Pamaripoka). Gopalganj (Faridpur).—To investigate Rice *Hispa*.

September.—Deganga (24-Parganas).—To investigate rice *Fulgorid* (*Liburnia* sp., loc. "Madhupoka") and demonstrate bagging.

November.—Bankura and Chinsura (Hooghly).—To investigate *Bhapu* disease of paddy with the Mycological Collector, Naogaon (Rajshahi).—To investigate red spider (*Tetranychus* sp., loc. "Makar") on *ganja*.

January.—Naogaon.—To spray *ganja* with Vermisapon Special K. for red spider.

February.—Barasat, Khulna, Suri, and Brahmanbaria.—To attend exhibitions Naogaon.—To investigate "Ambala" disease of *ganja* and gram caterpillar (*chloridea obsoleta*, loc. "Hirkati"), a *ganja* pest.

March.—Amta (Howrah).—To investigate army worm of rice (*Lenlania unipuncta*) on *boro* paddy. Kamarchar (Mymensingh)—To attend exhibition.

June.—Rangpur.—To investigate the mango weevil.

The more important items of work are noted below.

The investigation of the *Bhapu* disease of paddy of Western Bengal was taken up with the Mycological Collector.

Experiments started to check the mango weevil by kerosine treatment were continued.

The *ganja* pests of Naogaon (Rajshahi) were investigated. Vermisapon Special K. was tried experimentally for red spider, a serious pest of *ganja*, and good results were obtained.

In the exhibitions common insect pests were shown and their life histories explained to the people and the use of entomological appliances, such as spraying machines, field bag etc., were demonstrated.

Observation and treatment of crop pests on the Dacca Farm :—The most important pests observed on the farm were the following :—

Rice case worm (*Nymphula depunctalis*, loc. "Chongapoka".)

Rice *Hispa* (*Hispa œnescens*, loc. "Lohajuri poka.").

Rice stemborer (*schoenobius bipunctifer*, lac, "Majra").

Jute semilooper (*Cosmophila sabulifera*, loc, "Chhat poka").

White ant (*Termes* sp, loc, "Ui").

Mothborer (*Chilo* sp. loc, "majra").

White mothborer (*Scirpophaga auriflua*, loc, "sada majra").

Mango shootborer (*Alcides* sp).

White weevil (*Myllocerus discolor*).

Red spotted scale (*Aspidiotus* sp).

The *lichi* mite (*Phytoptus* sp).

The plantain borer (*Oddiporus longicollis*).

The Pulse Beetle (*Bruchus* sp).

To check the ravages of the above pests spraying, bagging, handpicking, fumigation etc, were resorted to where possible.

Parcels.—A number of parcels of specimens were received and reported on.

Identification.—A few species of insect pests were sent to Pusa for identification and they were received back with names.

List of Injurious Insects.—A list of Injurious Insects of Bengal was prepared for the Imperial Entomologist.

Entomological lantern slides.—Arrangements have been made for the preparation of a number of lantern slides illustrating life histories of insects, spraying, bagging, etc.

Publications.—The following publications were issued :—

(1) Leaflet No. 3 of 1913 insect pests and general measures for prevention and remedy.

(2) "Dhaner poka"—a Bengali book on Rice pests.

P. C. SEN,

Entomological Collector.

The 22nd July 1914.

MYCOLOGICAL REPORT FOR THE YEAR ENDING THE 30TH JUNE 1914.

THE Mycological Collector spent 135 days on tour during the year. Most of his time was occupied supervising experiments started in Noakhali, Loksam and Bikrampur to check the eelworm disease on paddy locally known as Ufra, Dak or Thoramara which is very prevalent in the inundated tracts of Bengal.

The investigation of another paddy disease called *Bhapu* in the Burdwan division particularly in Bankura, has been taken up. This disease like *Ufra* has, according to the statement of local rayats, been in existence for the last ten years, and has gradually been spreading. Unlike *Ufra*, it is said to damage only the transplanted paddy.

He visited Rangpur to demonstrate the spraying of Bordeaux mixture in connection with potato blight, and also Ranaghat to investigate a cocoanut palm disease.

He attended the Barasat, Khulna, Suri and Kamarchar (Mymensingh) exhibitions, in which specimens of the more important parasitic fungi prevalent in the province were exhibited, their life history explained and instructions given to the visitors as to the best methods of combating them.

The following parasitic fungi, some of which are on new hosts have been observed during the year in the Dacca farm and its vicinity :—

Phytophthora on Agaves.

Colletotrichum on „

Phytophthora on *Sida spinosa*.

„ on *Itibiscus Abelmoschus*.

„ on *Rhea* (Boemeria niva).

Fusarium Lycopersia sacc on *Lycopersicumesculentum* (Tomato).

Uredo fici cast on *Ficus Carica* (Fig).

Uromyces appendiculatus (Perk) Lk., on *Vignacatiang* (Cow pea).

Oidium on *Gesamum indicum* (Til).

Peronospora parasitica Pers de By on *Brassica juncea* (mustard).

Chrysomyxa on *vitis latipolia*, Roxb.

Cronartium zizyphi Syd et Butl on *Zizyphus œnoplia*.

Rhizoctonia violacea on *corchorus* sp. (jute).

A. L. SOM,

Mycological Collector.

A REPORT ON FISHERY WORK DONE IN BENGAL, BIHAR AND ORISSA DURING THE YEAR ENDING 30TH JUNE 1914, BY T. SOUTHWELL, ESQ., A.R.C.S. (LONDON), F.L.S., F.Z.S., M.R.A.S., DEPUTY DIRECTOR OF FISHERIES, BENGAL, BIHAR AND ORISSA.

Tours.—I was away from Calcutta on tour on 175 days and I visited the following places :—

Bengal.

1. Barisal.
2. Berhampur Court.
3. Burdwan.
4. Chandpur.
5. Chittagong
6. Comilla.
7. Dacca.
8. Darjeeling.
9. Jalpaiguri.
10. Khulna.
11. Noakhali.
12. Nagrakata.
13. Rampur Boalia.
14. Suri.
15. Ulubaria.

Bihar and Orissa.

1. Balasore.
2. Bankipur.
3. Bettiah.
4. Bihta.
5. Buxar.
6. Chilka Lake.
7. Cuttack.
8. Gaya.
9. Khurda Road.
10. Monghyr.
11. Motihari.
12. Muzaffarpur.
13. Puri.
14. Rajmehal.
15. Ranchi.
16. Sambalpur.
17. Savan.
18. Siripur.

Reports of my inspections of the places named have, in every case, been sent to the Director of Agriculture of each province.

Mr. B. Das, M.A., Superintendent of Fisheries, was on tour for 202 days and visited the following places :—

Bengal.

1. Amta.
2. Barasat.
3. Barisal.
4. Brahmanbaria.
5. Canning Town.
6. Champadanga.
7. Chandpur.
8. Chittagong.
9. Comilla.
10. Dacca.
11. Damukdia.
12. Diamond Harbour.
13. Goalundo.
14. Hasnabad (Chingrighata).
15. Khulna.
16. Midnapur.
17. Nadia to Plassey *via* Bhagirathi.
18. Noakhali to Laksam.
19. Rampur Boalia.
20. Saraghat.

Bihar and Orissa.

1. Monghyr.
2. Purnea.
3. Rajmehal.
4. Ranchi.
5. Sringheswar.

This officer availed himself of two months' privilege leave from 20th April 1914.

Mr. S. M. Mohsin, Superintendent of Fisheries, was on tour for 200 days and visited the following places :—

Bengal.

1. Amta.
2. Burdwan.
3. Champadanga.
4. Goalundo.
5. Kharagpur.
6. Khulna.
7. Kishorganj.
8. Kolaghat
9. Netrakona.

Bihar and Orissa.

1. Arrah.
2. Akrikhuda.
3. Balugaon.
4. Barh.
5. Bhadrak.
6. Bakipur.
7. Bhagalpur.
8. Buxar.
9. Chupra.
10. Chilka Lake.
11. Colgong.
12. Jamalpur.
13. Jelasore.
14. Laheria Serai.
15. Mokameh.
16. Monghyr.
17. Muzaffarpur.
18. Rupsa.
19. Sambalpur.
20. Samastipur.
21. Satpara.

Copies of the fortnightly diaries and inspection reports of the above officers have, in every case, been sent to the Director of Agriculture of each province.

Babu Surendra Nath Ghosh, licentiate in medicine and surgery of the Calcutta Medical School, has been attached to the Department during the whole year as a Zoological Assistant. He was on tour for 163 days and visited the following places :—

Bengal.

1. Amta.
2. Asansol.
3. Bogra.
4. Baraset.
5. Banjetia.
6. Champadanga.
7. Dacca.
8. Damukdia.
9. Daulatpur.
10. Dinajpur.
11. Fulchari.
12. Goalundo.
13. Jessore.
14. Kolaghat.
15. Lohagara.
16. Magrahat.
17. Malda.
18. Naihati.
19. Rangpur.
20. Rampur Boalia.
21. Saraghat.
22. Suri.

Bihar and Orissa.

1. Bankipur.
2. Balugaon.
3. Barh.
4. Balasore.
5. Chilka Lake.
6. Gaya.
7. Monghyr.
8. Manikpatna.
9. Mokameh.
10. Muzaffarpur.
11. Purulia.
12. Purnea.

A second Zoological Assistant, Babu Indra Bhusan Chatterjee, a B.Sc. in Zoology of Allahabad University, was appointed on the 1st of September 1913 on a salary of Rs. 50 per mensem. He left the Department on the 1st of April 1914, the salary and prospects being insufficient to tempt him to remain. During his appointment, he was on tour for 100 days at the following places :—

Bengal.

1. Asansol.
2. Canning Town.
3. Damukdia.
4. Khulna.
5. Kishoreganj.
6. Mymensingh.
7. Netrokona.
8. Pabna.
9. Saraghat.

Bihar and Orissa.

1 Bankipur.
2 Bihta.
3. Monghyr.
4. Purnea.
5. Rajmehal.
6. Ranchi.

Publications.—(1) The distribution of the three vernacular publications issued last year has been completed. In all, roughly 65,000 copies have been distributed amongst fishermen, and to Municipalities, offices of the Public Works Department and District Boards, Magistrates, Subdivisional Officers, Rajas and Maharajas, many zamindars and others throughout every district in Bengal and Bihar and Orissa.

(2) A report has been made, outlining a practical scheme for initiating trawling on commercial lines, in the Bay of Bengal.

An attempt was made through the Chamber of Commerce, Calcutta, to organise a lecture, the object being to place the facts with reference to trawling in the Bay, before the capitalists of Calcutta. Unfortunately the attempt failed. As in many other countries, the economic value of the fisheries is not appreciated. In Bengal they are exceptionally great, and when once this fact is clearly realised the opening out of these fisheries is bound to proceed with considerable rapidity.

(3) A similar report outlining a practical scheme for opening out the Sunderbans fisheries has also been prepared.

(4) An investigation (which occupied several months), was made into the fish trade of Bengal, and of Calcutta in particular, for the year ending 31st March 1913, and a report has been prepared and submitted. It is a common statement that fish are becoming scarcer in Bengal. This report was prepared with a view to obtaining accurate statistics under the following heads :—

(*i*) *Foreign trade*—

(*a*) Imports to Bengal.
(*b*) Exports from Bengal.

(*ii*) *Trade within the province.*—Imports into Calcutta monthly from the principal fishing centres.

The results of this investigation clearly indicate a shortage in the supply of fish to Calcutta, the imports being roughly ·27 of the actual requirements.

The foreign trade is of small extent and of very little importance ; the imports being mostly tinned fish, and the exports dried prawns, etc.

It is increasingly evident that under the present conditions the fresh water and estuarine fisheries are unable to supply the demand, and consequently the opening out of the Marine and Estuarine fisheries is a matter of the greatest possible moment.

(5) The papers dealing with (i) the Marine and Estuarine fisheries, (ii) the fish trade in Bengal, and (iii) a report (published last year) on the *hilsa*-hatching operation conducted at Monghyr in 1912, have been published together as Bulletin No. IV, Fisheries Department, Bengal and Bihar and Orissa.

(6) A map has been published showing the distribution of *hilsa* in the rivers of Northern India. I had anticipated being able to indicate the intensity of distribution along the course of these rivers, but it was eventually found impossible to do so with great accuracy, owing to the peculiar local distribution of *hilsa* fishermen.

(7) A paper describing—amongst others—thirteen larval parasites from the mesenteries of marine fish was published during the year in the Records, *Indian Museum*, Volume 9, Part V, No. 19, December 1913. This paper is of a purely scientific nature.

(8) A paper giving a short account of our present knowledge of the *Cestode* fauna of British India and Ceylon, has also been published during the year. This paper was read before the first Indian Science Congress at the Centenary Celebrations of the Indian Museum, organised by the Asiatic Society of Bengal, in January last. It was published by the Asiatic Society of Bengal, and amongst other details, summarises our knowledge of the *Cestode* parasites occurring in fishes from Ceylon and India.

The following papers are in preparation :—

(1) A report of the Chilka Lake fisheries.

(2) A report setting forth methods of improving the fresh water (river) fisheries.

(3) A paper on carp in India.

(4) A paper on the fish trade in Bengal for the year ending 31st March 1914.

Laboratory work.—It is with regret that I have to report that during the year the general work of the department has left me with but little time to devote to scientific investigation, and the hope expressed in my last report has not materialised. It is to be remembered, however, that the department is, comparatively speaking, a new one. The work of thoroughly familiarising myself with the condition of the fisheries throughout Bengal and Bihar and Orissa, appeared to me to be of very great importance and the result of my experience has left no doubt in my mind that the first necessity with reference to these fisheries, is better organization, and it was to this end that I directed my attention. There are many scientific problems of great practical importance which are urgently requiring attention, and the solution of which is vitally necessary for the ultimate success of fishery work, but it seems undoubted that an improved state of organization will be absolutely necessary before extensive scientific results can be generally applied.

The work done in the laboratory may be summarised as follows :—

I.—Investigations on carp were completed, but unfortunately, owing to pressure of other work, I have been unable to submit my report up to the present. It is clear that these fish will not breed in still or tank water. A current is always necessary. Hence they never breed outside rivers or *nalas*. The buoyant nature of their eggs results in a great mortality during the rains, the eggs and fry being stranded in paddy fields. To obtain a current of running water through a tank is rarely possible, and even where possible, the expense is prohibitive. The further cultivation of carp in India will depend on the establishment of hatcheries, and on rearing the fry, up to a certain age, in suitable tanks free from predaceous fish.

II.—During last August, disease broke out amongst the carp placed in the experimental tanks at Siripur. Owing to the kindness of Mr. Mackenzie, I was able to examine the parasites causing the disease. They proved to be parasitic *Copepoda*, belonging to the genus *Argulus*. They attack the skin and gills, producing profound anæmia and death. The disease spreads rapidly and is usually fatal to all the carp in the tank. Fortunately, Mr. Mackenzie took steps at once. Many of the fish were captured and scraped as free as possible from parasites. Bamboos were erected in the tanks, and the fish eventually freed themselves. There was no mortality. The tank in which the disease broke out was one of three, all of which were connected with a pipe. This tank (only) was surrounded by matting in order to keep out frogs. The other two were unprotected. It is significant that the disease only appeared in the tank from which frogs were excluded.

A disease, probably similar in nature to the above, was reported to me during the year from Santosh in the Mymensingh district, and there appears to be little doubt that extensive deaths, caused by this parasite, are not rare.

III.—A large ribbon-like parasite (*Amphilina magna*, Southwell), measuring 250 mm. long and about 12 mm. broad, was described from the cœlom of a marine fish (*Diagramma crassispinum*). The parasite is a new one, and is a giant amongst its kind, the nearest largest species in that genus, *Amphilina liguloidea*, measuring only 80 mm. The parasite is of scientific interest only.

IV.—Last year, four sets of fishery exhibits were prepared for various agricultural exhibitions. This year the number was increased to 7.

V.—The Forest Officer, Naini Tal, reported to this office the occurrence of a fatal disease which has appeared amongst the trout in the streams and lakes near Naini Tal, and sent down numbers of preserved specimens. In many cases I found a pathological cancerous-like growth on the gills, sufficient to account for death. The microscopic examination of preparations of this tissue has occupied considerable time, and at present I am not in a position to submit a statement.

Propaganda work.—A reference to the list of places visited by the officers of this department during the year, together with the number of days on which the officers were on tour, will show that extensive propaganda work has again been continued. Practically every district in both provinces has been visited. The fishermen as a class are poor, and, besides being of a conservative disposition, are frequently suspicious. Consequently we have little in the way of results to show. At every place visited by us, the fishermen have been mustered, their difficulties and grievances listened to, and, where possible, remedied. The opportunity has been taken to give talks to them on fishery matters in general, such as stocking tanks, disposing of fish, and the care of fry, and elementary accounts have also been given relating to the breeding and other habits of fish in general, etc. At each place, where possible, we interviewed the Municipal Chairman or Vice-Chairman, the object being to stimulate enterprise with reference to municipal tanks. We also similarly interviewed the officers of the Public Works Department and the Chairman or Vice-Chairman of the District or Local Boards, and distributed vernacular pamphlets freely. The Savan Municipality, the Subdivisional Officer of Sambalpur, and the Khas Mahal Officer, Monghyr, have taken up culture on definite lines in the tanks under their control, and I have reason to believe that this example will be followed shortly by many others. Several private individuals are also taking up fish culture on lines suggested by this department.

The most hopeful signs, however, are perhaps those which indicate the likelihood of co-operative credit societies being formed amongst fishermen in the near future at certain places. In conjunction with the Registrar of Co-operative Societies, Bengal, this matter is receiving special attention, and my experience of the fishermen at the places I have in mind, leads me to believe that before long the establishment of such societies for fishermen will be an accomplished fact. If the co-operative credit society is a movement designed to benefit and uplift the poorer classes, there is ample scope for its operations amongst fishermen. The lines on which such a society could work would be in helping to free the fishermen from the clutches of the money-lenders and the Nikaries, in assisting them to obtain cheaply, nets and boats necessary for their calling; in arranging, where desirable, for the disposal of their catch at a reasonable rate, and, when necessary, in assisting bodies of fishermen to acquire the fishing rights direct without the unnecessary and expensive intervention of lessees and sub-lessees.

Agricultural Exhibitions.—This department attended and had exhibits at the following places:—

Bengal.

1. Banjetia.
2. Baraset.
3. Brahmanbaria.
4. Khulna.
5. Suri.

Bihar and Orissa.

1. Bihta.
2. Monghyr.
3. Muzaffarpur.
4. Purnea.
5. Ranchi.
6. Sambalpur.
7. Sringheswar.

The exhibits were similar to those detailed last year and need not be described here.

At all these places the visitors in general took a lively interest in the fishery exhibits, particularly in the actual demonstrations that were given of salting and smoking fish. Lectures on the breeding habits of the commoner edible fish, on tank culture, and on methods of packing fish for the purpose of transport from one place to another, etc., were given, and appeared to be appreciated greatly. It was particularly satisfactory to note that many educated Indian gentlemen interested themselves in the subjects dealt with.

Hilsa culture.—As the construction of the launch was not completed during the year, no further investigation into the the habits of this fish was possible. As already noted, a survey has been made regarding the distribution of this species in the rivers of Northern India, and a map embodying these results has been published. This investigation occupied several months. In our report of the *Hilsa*-hatching experiments conducted at Monghyr during September 1912, it was shown that the eggs of this species sink low in the water, and are thus never carried into the paddy fields and low-lying areas and lost during the floods. Although they are thus naturally protected, it should not be assumed that hatcheries are unnecessary or undesirable. The mortality amongst eggs and young fry, from other causes, must be very great indeed, and the initiation of successful hatcheries would be certain to have a good effect.

Culture of voracious fish.—As our investigations on Indian carp are concluded for the present, the stations at Angul, Siripur, Berhampur and Bankipur were closed during the year. Observations on the breeding habits of certain predatory fish of commercial importance have now been commenced. The tanks at Bankipur are being utilised for the culture of, and for observations on, the breeding habits of *Notopterus chitila* (*Chital*). *Ophiocephalus marulius* (*Sal*), and *Ophiocephalus gachua* (*Cheng*). Of *Chital*, 32 brood fish (males and females) were obtained and placed in one tank; 10 brood fish of *Sal* were placed in a second tank, and 50 brood fish of *Cheng* were placed in a third tank.

Through the kindness of Babu Surendra Nath Ganguly, a tank in Narkeldanga, Calcutta, has been placed at our disposal, and in this tank we have placed 50 *Cheng*. The large tank in Entally, Calcutta, belonging to the Sanitary Commissioner, Bengal, has also been placed at our disposal, and into this tank we have placed 100 *Sal*. A report on the observations made, and on the results obtained, will be submited in due course.

Tank culture.—The tanks in Bengal collectively cover a fairly large area, and the cultivation of carp in tanks is carried on extensively. The principal point in which carp culture is unsatisfactory in Bengal, arises from the fact that the culture of carp can rarely proceed satisfactorily in tanks which contain voracious fish, and it is frequently impossible to prevent voracious fish from entering tanks, or to remove them when once they have gained access, without incurring great expense. Very many tanks are flooded during the rains, or are too deep to drag and in both these cases fish-culturing operations in them cannot be satisfactorily controlled. Tanks which dry up during the hot weather are wholly unsuited for fish culture, but such tanks may often be used to advantage for rearing purposes.

The privately owned tanks throughout Bengal are made use of exclusively in a private way, the fish contained therein being conserved for events of domestic importance and never sent to the market. An improved method of culture would ultimately result in an increased supply, and were it eventually found possible to overcome the popular prejudice which exists against marketing fish, the effect on the fish-supply in general would be very beneficial.

Distribution of carp fry.—Carp breed during the early part of the rains, and their eggs and fingerlings are available in quantity at that time in most rivers. In the Howrah district the principal places where carp fingerlings are available are Amta and Champadanga, on the river Damodar, and for many years past a fairly extensive trade has been carried on, in and round Calcutta, in carp fry, the fishermen selling them in the streets for purposes of stocking tanks. It would appear that the eggs and fingerlings available at the above places are those of fish which have bred in the lower reaches of the river, and the occurrence of such immense quantities suggests the possibility of such fry being in some danger of being carried into brackish, and even into salty water and lost. Carp of all kinds are by no means plentiful in the Damodar. The river is not a long one, and, as the development of carp eggs occupies several days, it seems reasonable to assume that the large number of eggs and fingerlings caught at Amta and Champadanga represents a fair percentage of the total fish spawn in the river. It was therefore decided last year to collect numbers of eggs and fingerlings, to rear them in tanks to a size of say two inches, and then to return them to the river at an age and size when they would be able to successfully swim against the current, and migrate to the higher reaches of the river. Accordingly 100,000 of such fry were placed in especially chosen tanks at Burdwan during last rains. Unfortunately, the unprecedented flood which occurred in that district last year carried away all the fry in the rearing tanks, and rendered further operations impossible. But the attempt is being made again this year.

We have further secured two tanks at Amta, close by the river, and are at present engaged in stocking these tanks with about 30,000 fry. After the fry have hatched out and attained a suitable size, the young fish will be placed in the Damodar river.

In the several tanks at Dacca 150,000 carp fry were deposited during the month of July. Unfortunately, owing to the administrative changes effected in 1912, these tanks were not fully under the control of this department. Consequently the major portion of these fry appear to have been stolen. In one particular low-lying tank, numbers of fry were undoubtedly carried away by flood. A certain number of tanks at Dacca have now been definitely placed under the charge of this department, and it is hoped that

this year the cultivation of fry will proceed satisfactorily. By request, the following tanks belonging to the Calcutta Municipality were stocked with fry during July 1913:—(1) College Square tank, (2) Cornwallis Square tank, (3) Loudon Square tank, and (4) Auckland Square tank.

The tank belonging to the Campbell Medical School was also stocked, at the request of the Superintendent, and also at the request of Dr. Anandale the tank in the compound of the Indian Museum, Calcutta.

I have already pointed out that during the year we have personally brought to the notice of Municipalities, District Boards, etc., the fact that such fry can be supplied to them at market rates, by this Department, and in this way we have endeavoured to stimulate enterprise with respect to tanks under the charge of such public bodies. At present it is too early to state, with any degree of certainty, the extent which the traffic is likely to assume this year, but the following distributions have already been made up to the present by this department:—

Dacca	150,000
Amta	30,000
Burdwan	130,000
Khulna	24,000
Purulia (Bengal Nagpur Railway)	12,000
Nainpur (ditto)	12,000
Rahara, 24-Parganas	6,000
Corporation of Calcutta	48,000
Indian Museum, Calcutta	18,000
Campbell Medical School, Calcutta	12,000

Quite possibly this number will be doubled during the present rains. Arrangements have already been made with the various railway authorities to allow consignees to take the *handies* or vessels containing the fry, in the same compartments, where they may be carefully attended to *en route*.

Up to the present we have only been able to supply *mixed* eggs or fry. These consist principally of *Rohu (Labeo rohita)*, *Catla (Catla buchanani)*, *Mrigal (Cirrhina mrigala)*, and *Calbasu (Labeo calbasu)*, together with a certain number of eggs or fry of voracious fish. These mixed eggs are, in a general way, suitable for stocking tanks, and there is the additional advantage of their being very cheap, an average rate being about Re. 1 per thousand. However, as nearly all the tanks in Bengal contain voracious fish, the mortality amongst such small fry, when placed in tanks, is usually high. The larger the fry the less danger there is of their being devoured by voracious fish. But fry two or three inches long are expensive, the cost being roughly about Rs. 15 per hundred. The poorer classes are, therefore, unable to purchase the larger fry. During next rains we are hoping to be able to considerably extend this industry in carp fry, and to establish rearing tanks, with temporary distributing depôts near Howrah and Sealdah, where the older fry or fingerlings will be easily accessible to applicants from the mufassal, at the same rate as the eggs or small fry. A steady and persistent improvement and extension, year by year, on the lines indicated above, will mean a great improvement in tank culture generally. At the same time it will tend to mitigate the extensive mortality in nature amongst eggs and fry, near the mouth of the river.

Experiments conducted at Goalundo with Captain Solling's paper for preserving fish.—With a view to testing, in India, the efficacy of Captain Solling's patent paper for preserving fish during transportation, and in order to ascertain whether or not it is practically feasible to introduce it with advantage among the fish dealers in general, an experiment was made at Goalundo during August 1913 in treating *Hilsa* and other fish according to Captain Solling's process. The chief points to be observed in this method of packing fish are that the fish should be gutted immediately it is caught, and the gills and intestines removed at once. The fish is then split, if necessary, and washed thoroughly clean, and then wrapped in Captain Solling's paper and placed in ice. There are certain other minor details to be attended to in packing the fish, but these need not be elaborated here. For purposes of comparison, the fish were packed under similar conditions in the following way:—

I.—Ungutted fish—

(*a*) As caught. | (*c*) In Solling's paper.

(*b*) In ice. | (*d*) In ice and Solling's paper.

II.—Fish gutted the moment it was caught—

(*a*) As gutted. | (*c*) In Solling's paper.

(*b*) In ice only. | (*d*) In ice and Solling's paper.

Three sets of experiments on the lines indicated above were carried out in temperatures varying between 80° F, and 91° F, and observations were taken in each case. The results are summarised below:—

I.—Ungutted fish—

(*a*) As caught	Kept good for from	13 to 18 hours.
(*b*) In ice	Ditto	83 to 88 „
(*c*) In Solling's paper alone ...	Ditto	14 to 18 „
(*d*) In ice and Solling's paper ...	Ditto	92 to 99 „

II.—Fish gutted the moment it was caught—

(*a*) As gutted	...	... Kept good for from 15 to 20	hours.
(*b*) In ice only	...	... Ditto 108 to 113	„
(*c*) In Solling's paper alone		... Ditto 16 to 20	„
(*d*) In ice and Solling's paper		... Ditto 111 to 125	„

It will therefore be seen from the above statement that Captain Solling's process of packing fish does not appear to possess marked advantage over the ordinary method of packing fish in ice, especially considering the trouble, labour and cost entailed in its execution. Consignments of fish differently treated, in ice, according to Captain Solling's process, were sent to the Director of Agriculture, Bihar and Orissa, at Ranchi, who arranged for the fish to be distributed, for opinion, among European officials as well as among certain of the Indian population there. As to the taste and flavour of the fish, there was a consensus of opinion that Solling's paper gives results superior to those of ordinary packing in ice. But the general public are not very keen regarding delicacy of taste and the like when they can get equally good fish in all other respects at a cheaper rate.

Marine and estuarine fisheries.—The opening out of marine and estuarine fisheries is of the greatest possible importance to this Presidency. The people of Bengal are essentially fish-eaters. Fish is dear and the supply is hopelessly inadequate. From statistics collected, it is clear that the Sunderbans fisheries alone, under proper management, would yield not less than 200,000 maunds of fresh fish per annum. The *Golden Crown*, unsuited as she may have been for commercial work, nevertheless, proved that trawling in the Bay could be made commercially successful. Three small trawlers working in the Bay would furnish yearly not far short of 300,000 maunds. In other words, the marine and estuarine fisheries represent a minimum of 500,000 maunds of excellent food-stuff, per annum, of a net value of not less than Rs. 1,00,00,000. It is astonishing that such facts do not appeal to capitalists in the Presidency. In Ceylon, I understand that a company or syndicate is being formed to exploit, by means of steam trawlers, the narrow strip of ocean lying between the fringing reefs and the overfalls. In the Bay of Bengal the potential area covers 38,856 square miles. The immense possibilities of these fisheries are not understood and appreciated. When once they *are* appreciated, their exploitation is sure to follow, but until these fisheries are opened out, I am of opinion that fishery problems in Bengal will become increasingly acute.

Chilka Lake fisheries.—It was ascertained that during the year ending 31st March 1913 the total quantity of fish exported from the vicinity of the Chilka Lake amounted to 8,699 maunds. As most of this fish was dried, it seemed safe to assume that the total annual catch of fish on the Chilka Lake was not less than 12,000 maunds. In view of the general shortage of fish in Calcutta, it was decided to investigate the matter further, with a view to ascertaining whether or not it was possible to place this fish, *fresh*, on the Calcutta market. When fish is salted and dried it loses very considerably in weight, and not only so, but its value also decreases. Consequently the Chilka Lake fishermen, in spite of the labour entailed in salting and drying, probably do not realise more than one-third the price for the salted product that they would obtain for the fish *fresh*, were it possible to sell the fish fresh in the Calcutta markets. It was suggested that if the Government of Bihar and Orissa could successfully initiate the business of exporting fresh fish to Calcutta, the fishermen might eventually be persuaded to form, amongst themselves, a co-operative credit society, and in this way carry on the business begun by Government. It was not proposed introducing any new methods of fishing, but merely collecting fish from the fishermen, day by day, by means of a launch. A very careful study was made of this scheme by the Director of Agriculture, Bihar and Orissa, and the fullest details were obtained. Unfortunately it was found that the major part of the catch on the Chilka Lake consists of shrimps and prawns, that the fish caught are usually small, unsuited even for salting, and not likely to command good prices in Calcutta. A further difficulty was that no suitable train service was available, and, even if good fish had been procurable, it was thought unlikely that it would sell well if placed on the market late in the forenoon. The scheme was therefore eventually abandoned.

During the year the Superintendent of Fisheries and the Zoological assistant spent over two weeks on the Chilka Lake, giving instructions and demonstrations on, and attempting to initiate better methods of, salting and curing fish. Simple accounts of the life history of fishes generally were also given, and an attempt was also made to induce the fishermen to make use of the sharks and rays which occur fairly plentifully there.

General.—During the year a survey has been made relative to the fishery rights over the main rivers in Bengal and Bihar and Orissa. The object of this survey was to obtain the fullest details regarding the fishery rights, viz., whether such rights belonged to Government. My report is in preparation and will be submitted in due course. Where the fishery rights belong to zamindars, the improvement of such fisheries lies in their hands. Usually the fishery rights are leased out, and the leases re-lease. Very frequently the second or third lessee re-leases again in small lots. The burden eventually falls on the fisherman, and hence it is necessary for him to sell his fish at a high price in order to meet charges levied against him for the privilege of fishing.

In most cases the fishery rights owned by Government are likewise leased out with similar results. Certain stretches of river, the rights over which belong to Government,

are, however, not leased out, as for instance in the Rupnarayan at Kolaghat, and in the Ganges at Malda. In such stretches of river, important and inexpensive experiments might be made to fish commercially, in a small way, by modern methods. The wealthier zamindars owning fishery rights would be well advised to adopt a similar course. The effect would be a great increase in the supply of fish, and in the revenue obtained from the fishery rights; and at the same time it would remove much of the hardship under which the fishermen throughout the province carry on their daily work.

In any particular district, the fishery rights belonging to Government are usually leased out to the same lessee, or to his son, decade after decade, for a trivial sum, the competition being small, with the unsatisfactory result noted in the preceding paragraph.

For the individual who has courage and industry enough to acquire fishery rights in one of the main rivers (and this is not difficult), and to adopt therein modern methods of fishing, there is indeed a bright future.

Trout culture.—During the year, the hill-streams in the vicinity of Darjeeling were inspected with the object of ascertaining whether or not trout culture could be carried on successfully in them. For the successful culture of trout, the streams should have an elevation of at least 3,000 to 4,000 feet. The streams in the vicinity of Darjeeling may be divided into two sets: first, rivers like the Teesta, the Ranjit, etc., which are but slightly elevated above sea level; and, second, the *jhoras* or small streams, which, dispersed along the mountain sides, become roaring torrents during the rains but dry up in the summer. It was obvious that in neither case was trout culture practicable. It might have been possible to conduct cultural operations on a very small scale in the reservoir at Senchal, but the limited possibilities of this reservoir, together with certain objections which arose on account of the fact that the water-supply of Darjeeling is derived from this tank, pointed to the undesirability of attempting operations at Senchal.

An enquiry into the general fisheries in the rivers near Darjeeling was also made. The scarcity of fish is to be correlated with the excessive turbidity of the river water during the rains, and with certain malpractices, such as dynamiting and poisoning of the waters in smaller rivers, which appear to be carried on fairly extensively. A preliminary enquiry was also made into the *Mahseer* fisheries in the district of Jalpaiguri. At present we know practically nothing about the general habits of this fish, other than isolated interesting facts furnished by anglers. Here, again, dynamiting and poisoning of water is, I am informed, fairly prevalent, and the destruction of small fry of all species, which rush up the streams after heavy showers, is common and extensive. The enquiry into the *Mahseer* fisheries will be continued and, if means can be devised for capturing numbers of this species at a time, it would not seem impossible to eventually start hatcheries for the cultivation of *Mahseer*.

In view of the fact that fairly extensive fishery operations have been, and are being, conducted in the Madras Presidency, it was considered advisable that I should visit the various places in that Presidency where fishery operations are being carried on. In their letter No. 1088, dated the 3rd February 1914, the sanction of Government was accorded to this proposal. However, at the request of the Director of Fisheries, Madras, my visit to the fishery stations has been postponed until next cold weather.

In December 1913 a paper was read by me on the "Fisheries of Bengal, Bihar and Orissa" before a meeting of the Board of Agriculture in India, at Coimbatore.

During November 1913 the Deputy Director of Fisheries gave a short course of lectures to the students of the Agricultural College, Sabour. These lectures were designed to instruct the students in practical fish-culturing operations, and it is hoped that the instructions given will be of service to them with reference to tanks and waterways which may eventually come under their control.

As previously noted, at the request of the Forest Officer, Naini Tal, an investigation is being made, as time allows, into the cause of an outbreak of disease amongst trout in the streams and lakes in the vicinity of Naini Tal, and a report thereon will be submitted in due course.

The rivers of Bengal and Bihar and Orissa are remarkably free from such obstructions as interfere with the normal movement of fish from place to place. The principal obstructions are (1) the anicut over the Sone at Dehri (Sone East Bank), and (2) the anicut over the Mahanadi at Cuttack. In the latter case, in particular, the anicut not only prevents the migration of *Hilsa*, but the fry and young of other species of fish, carried down by the streams and over the anicut during the rains, are prevented from returning up-stream. As a result, the fisheries situated distant to the anicut are decreasing in value yearly. At the foot of the anicut, where trapped fish congregate in large numbers, fishermen find a rich harvest, and reptiles a plentiful supply of food. The question of erecting two fish passes, one on the north side of the river and another on the south side—the two main channels of the river—is being considered by the Government of Bihar and Orissa, and plans have already been prepared. The main points to be observed in order to make these passes fully effective is, firstly, that they should operate immediately the rains commence; and, secondly, that fishing should be forbidden near the passes. If this is not done, the passes, instead of facilitating the migration of fish, will merely act as fish-traps. The destruction of reptiles in the vicinity of the passes should also be freely encouraged.

Up to the present I have had no opportunity of inspecting the weir at Dehri (Sone East Bank), but I hope to be able to do so at no distant date.

Remarks.—It will be evident from this report that the work of the department during the past year has been of a general character. The department is a new one,

facing problems of great magnitude and of even greater economic and scientific importance. Details regarding the area over which the department works are summarised in the following table:—

Locality.	Number of districts.	Area in square miles.	Population.
Bengal	27	84,092	46,305,642
Bihar and Orissa ...	21	111,829	38,435,293
Total ...	48	195,921	84,740,935

In addition to the above, the potential marine fisheries cover an area of 38,856 square miles.

The area covered by the British Isles is roughly 121,000 square miles, and the population, as furnished by the census of 1911, is about 45,141,000. It will thus be seen that the area covered by the provinces of Bengal and Bihar and Orissa is more than one and a half times that of the British Isles, and the population is almost double. In the British Isles there are three Fishery Departments, viz., the Scottish, Irish and English Fishery Boards, each department employing several men specially trained for the work. The Department of Fisheries, Bengal, Bihar and Orissa, consists of a staff of four only, and, in reviewing the work undertaken by the department, the preceding facts should not be lost sight of. Since my appointment the greater portion of my time has been occupied in thoroughly acquainting myself with the present state of the fisheries throughout both provinces. When the launch now under construction for this department is available, as we hope it will be within three months, we shall then be in a position to apply ourselves to investigations of a more economic and scientific nature than has hitherto been possible, and we then anticipate being able to acquire results of practical importance, comparable, in a small way, with those obtained by Fishery Departments in Western countries.

Unfortunately, in Bengal, the occupation of fishing, or dealing in fish, is looked upon as a business to be carried on exclusively by the lower classes. The whole industry is thus left in the hands of people with no capital, no education, and no business capacity. Under such circumstances it is hardly to be wondered at that the supply of fish is scanty.

In area and potentiality the fresh-water fisheries of Bengal are perhaps second to none; but there is room for great improvement. The establishment of hatcheries for carp in particular, and for other species of fish, is clearly desirable, in order to mitigate somewhat the annual disaster to eggs and fry occurring in the big rivers during the rains.

The rearing of eggs and fry removed from the mouth of the Damodar (where they appear to be in danger of extinction), and their return to the river as young fish at an age when they are able to look after themselves, seems to be a work of considerable importance, and should eventually give very satisfactory results. As time and opportunity allow, the stocking of other small rivers will be carried on, where the necessity is indicated. The rearing of fry in special tanks will further enable us to supply small fish for tank culture throughout the province, at an age when they are not likely to be devoured by voracious fish, and in this way a considerable improvement in tank culture generally is expected. For the present, these operations can only be carried out in a limited way, but it is hoped that we shall be able to extend the operations year by year. For the general improvement of the river fisheries, the sympathy and co-operation of zamindars is of the first importance, especially in view of the fact that the fishery rights in the main rivers for the most part belong to them. The general education of fishermen is a work not rich in results, but we venture to believe that it has not been wholly in vain.

The opening out of the marine and estuarine fisheries is desirable from every point of view. The result would be a great increase in the supply of fish, and it would also find employment and provide cheaper food for numbers of the poorer classes. The extent and value of these fisheries has already been indicated. In Bengal the two principal foodstuffs are rice and fish. The practical encouragement given by Government to the extension of agricultural pursuits in Bengal during recent years would yield results equally salutary if extended to fisheries.

T. Southwell,

Deputy Director of Fisheries, Bengal, Bihar and Orissa.

REPORT OF THE RANGPUR DAIRY FARM FOR THE PERIOD 1st APRIL 1913 to 30th JUNE 1914.

I.—Object.

Considerable attention is recently being paid by all classes of people to the problem of the improvement of cattle. The Rangpur Dairy Farm was started with the main object of solving this problem. An attempt is also to be made to run the farm on commercial lines and also to solve the problem, partly at least, of the milk-supply of muffassal towns. But both of these subjects are subsidiary to, and will not be allowed to interfere with, the main object of the farm, viz., the production of healthy calves of better strain.

If the idea of starting similar farms in other districts is carried out this farm will ultimately serve as a centre for supplying the animals as well as a training ground for the staff.

II.—Improvement.

Improvement is being sought to be effected by—

(*a*) the purchase of the best Bengal cows to serve as a basis to work on;

(*b*) judicious breeding with good Bengal bulls;

(*c*) liberally feeding the calves from the very beginning and selecting the best of them for breeding purposes. Male calves suitable for the purpose of breeding will be reared on the farm for three years and will then be distributed at suitable centres to serve as bulls. Inferior animals will be sold off as bullocks. The best heifers will be kept on the farm, gradually replacing the original stock, and the surplus will be sold to persons who will take an intelligent interest in the animals.

By following the above methods it is expected to breed up, in the course of a few years, a race of heavy milking cows as well as strong drought bullocks. It may be incidently mentioned here that if the importation of Bihar bullocks into Bengal goes on at the present rate, it will not be long before the supply will be exhausted. Even cultivators from Chittagong are now going to Sonepur for their cattle, and prices have risen as high as Rs. 150 to Rs. 200 per pair.

III.—Supply of pure milk.

One of the crying needs everywhere in Bengal, even in remote villages, is for pure milk, and a large proportion of infantile mortality may perhaps be ascribed to the use of impure and adulterated milk.

The surplus milk after allowing the calves their full share, is being sold in sealed cans, delivered to customers' houses. By carefully regulating the purchase of cows in the different seasons, a steady supply is being kept up. The milk is being sold at 4½ seers per rupee, but even at this comparatively high rate the demand is much greater than the supply. There has been no competition with the existing *goalas*, as quite a considerable proportion of the population have still to go without any milk because none can simply be obtained.

IV.—Practice of scientific agriculture on commercial principles.

The Government farms now in existence are maintained with the principal object of carrying out experiments, and cannot, from the very nature of their work, be made to pay. For every experiment that finally gives a successful result, there are probably fifty others which only yield negative results. The Rangpur Farm will, however, be run on commercial lines, and no crops will be grown and no methods adopted which have not already given successful results, financially, on the other farms. Systematic experiments will, however, be carried out with fodder crops in their various aspects. The cowdung will help in giving larger yields of crop than on the ordinary farms. It is also proposed to largely curtail the labour bill by using an engine for such purposes as crushing sugarcane and cattle food, cutting fodder, lifting water, etc. Should this aspect of the farm work out successfully, it will open a new career for our educated youths and create a demand for agricultural education.

V.—Locality.

Rangpur was selected as the most suitable place for starting the first cattle-breeding farm in Bengal for various reasons, chief among which were the following:—

(1) An excellent site close to the town was available at a very moderate cost, the cost for acquiring 1,000 bighas being about Rs. 40,000 only.

(2) There is a ready market for the sale of milk at a fair price.

(3) There was a strong local demand for such a farm.

(4) There are two farms already in Rangpur which could be worked in conjuction with it.

Site.—The farm is situated on both sides of the railway line, very close to the railway station and about a mile from the town. The southern boundary of the farm runs almost parallel to the Tajhat Road about 500 feet away from it, and the Skrine Canal forms the greater part of the northern boundary.

The farm has an area of 1,000 bighas consisting of 750 bighas of high land, 200 bighas of low land fit for *aman* paddy, and about 50 bighas of *bhil* (which dries up in the winter). With the exception of 40 bighas which is rather sandy, the high land is mostly suitable for the cultivation of jute, sugarcane, potato and tobacco.

It is proposed ultimately to deepen and reclaim the *bhil* and use it for rearing fish. The site was selected by Babu Ashutosh Lahiry, Secretary, local Agricultural Association,

and by myself and was approved by the Director of Agriculture, who inspected the site with the Collector, Mr. De.

Soil and climate.—All the high land practically belongs to one type. The soil is a light sandy loam, and appears to be deficient in lime. Samples have been taken by the Agricultural Chemist for analysis, but the results are not yet ready. The subjoined table shows the rainfall from 1st April 1913 to 30th June 1914. The scanty rainfall in June and July of the present year has been very detrimental to all standing crops and is delaying the transplanting of paddy :—

Month.	Quantity in inches.	Number of rainy days.
January 1913	...	...
February „	1·02	2
March „	·93	3
April „	·26	2
May „	9·50	12
June „	26·88	17
July „	21·37	12
August „	21·04	18
September „	15·83	15
October „	7·64	5
November „	...	...
December „	·60	1
January 1914	...	...
February „	2·30	2
March „	...	...
April „	3·20	8
May „	12·99	9
June „	7·45	6
Total ...	131·03	112

VI.—Work done.

Possession of waste and arable land was received on the 29th March 1913, but as the whole place was interspersed with tenants' huts, very little cultivation could be done until they moved away and until we had received possession of the whole area in November. When we took possession, about two-thirds of the farm was under jungle and waste. The work done may be described under the four following heads :—

(1) Reclamation.
(2) Construction.
(3) Cattle.
(4) Cultivation.

(1) *Reclamation.*—The jungle consisted of shrubs, small trees and of bamboo clumps which were rather expensive to dig up. Practically the whole of the jungle in the main block of about 400 bighas and of about 200 bighas in the other two blocks has been cleared. The rest will be cleared during the next winter. A considerable number of bamboo groves will be kept near the boundary. Another 100 bighas is being ploughed up with Turn-wrest plough and will be laid under *dub* during the present rains. One thousand five hundred yards of the boundary has been enclosed with wire-fencing. The work is proceeding and will be finished by the end of September.

Two *kutcha* roads, 1,500 yards in length, have been constructed, connecting the eastern and western boundary of the farm and passing, more or less, through the centre of the farm.

There are two *bhils* on the farm. The smaller one will be excavated next winter and used for bathing the cattle. It is proposed to use the other ultimately for rearing fish.

(2) *Construction.*—The following buildings have been constructed during the year under departmental supervision :—

Farm buildings—

	Approximate cost.
	Rs.
2 Cowsheds to accommodate 96 cows	7,395
2 Calf-pens	1,418
1 Milk and office room	4,702
2 Godowns	4,850
1 Bullock shed	1,447
1 Segregation shed	447
1 Curing shed	600
1 Pucca well	712

	Approximate cost.
Quarters—	Rs.
Superintendent	5,202
2 Overseers	2,651
1 Clerk	1,065
Apprentices—to accommodate 4	964
Goalas, peons and coolies—to accommodate 40 ...	1,500

(3) *Cattle.*—The original idea was to deal with purely Bengal cows, without any up-country blood in them. It was soon found, however, that there was hardly any pure breed in Bengal or even anything approximating to it. Even cows purchased from the remote interior were found to have traces of up-country blood in them. The few cows which were thought to be of absolutely pure country origin were very small in size and poor milkers. It was decided to get the cows from a wider field, and to get fairly good sized animals.

The following table shows the number of cows purchased up to 30th June, places where obtained from, and average prices:—

Where obtained from.	Number.	Average price, including freight, etc., per animal.
		Rs. A. P.
Dacca	23	91 8 0
Rungpur	12	62 12 3
Calcutta	3	121 2 0
Berhampore	2	76 11 6
Malda	14	69 11 9
Sonepur	9	127 12 0
Sirajganj	4	89 4 0
Total ...	67	...

During the visit of the Hon'ble Mr. P. C. Lyon, it was decided, after consultation with the Principal of the Belgachia Veterinary College, to import a few Bihar cows, to test their suitability to this district, and I visited the Sonepur fair in November 1913, for the purpose. Most of the cows at the fair were from the United Provinces and the Punjab.

The best milkers among the Bihari cows were found to be those belonging to what is popularly known as the Taylor breed—a cross between an English bull with Bihari cows. Nine cows were purchased. One of them unfortunately died after she had been here for a few months only. It is not possible to make any statement yet as to their suitability to this place; but the yield of milk has greatly fallen off. This has been the case more or less with all cows imported from other districts. It is expected that they will improve when the pastures are properly laid out. So far, the cows from Dacca and Malda appear to have undergone the least amount of deterioration.

The following statement shows the daily average yield of milk per cow per day for the milch cows only. It will have to be remembered that these amounts were obtained after the calves had sucked a considerable amount of milk, the main object being to rear healthy calves:—

April	1913	7·1 lbs.
May	„	6·3 „
June	„	4·4 „
July	„	4·5 „
August	„	3·8 „
September	„	3·3 „
October	„	3·5 „
November	„	4·3 „
December	„	4·5 „
January	1914	4·1 „
February	„	4·4 „
March	„	3·7 „
April	„	3·0 „
May	„	3·2 „
June	„	3·8 „

One explanation of the diminishing daily average is that the calves are receiving more milk now than they used to before.

Feeding.—Linseed cake, *mushari* and *mati kalai, bhusi* and *joar* are the principal food given to the cows. The average cost of feeding and upkeep per month is (on an average of April, May and June 1914) as follows:—

	April.	May.	June.
	Rs. A. P.	Rs. A. P.	Rs. A. P.
Food	4 8 8	5 1 7	4 12 5
Labour	2 7 8	2 6 8	2 0 0
Total ...	7 0 4	7 8 3	6 12 5

Eleven pairs of Bihari bullocks were purchased in March 1913, from the Darwani fair (Rangpur), at a total cost of Rs. 1,185-13-9, three pairs were purchased in November from the Sonepur fair at Rs. 554-10-3, eight pairs were purchased at local fairs at Rs. 1,290-15-9. They are all Bihar animals.

Diseases and casualties.—There was a severe attack of scour among the calves early in April 1914, which carried off three calves. A fourth calf, although it recovered from the immediate attack, succumbed ultimately. A severe attack of streptothrycosis occurred among the herd towards the latter part of April. With the exception of 12 cows, the whole herd showed symptoms either in a mild or severe form. The milder cases yielded to painting with iodine, but 15 cases had to be operated. So far there has been one death only.

The following statement shows the number of casualties during the year:—

	Cows.	Calves	Bulls.	Bullocks.
Sold	1	8	...	...
Died	4	24	...	...

*The male calves were all castrated before being sold.

It may be stated that the heavy deaths among the calves occurred during the last rains, when they were very badly housed in temporary sheds.

The subjoined table shows the stock in hand on 30th June 1914:—

	Number.
Bulls	2
Bullocks	44
Cows	62
Sucking calves	43
Bull calves	1
Heifers	14
Total ...	166

The purchase of cows is going on, but considerable difficulty is being experienced in securing good animals. It is expected to bring the herd up to 150 before the end of March 1915.

(4) *Cultivation.*—Five hundred bighas have been brought under cultivation during the year. Of this, about 250 bighas have been cultivated on the *adhi* system, the tenant doing all the cultivation and the farm getting half the produce. With the exception of about 15 bighas of jute, paddy is practically the only crop grown under this system.

Crops.—During the monsoon of 1913, a small area of *joar* for fodder was practically the only crop grown. A small plot of Guinea grass was also laid down for further propagation. During the winter the following fodder crops were tried: Mangel-wurzel, turnip, oats and peas. Oats and peas did fairly well. Turnip did not do very well; but the mangel grew fairly well and will be tried on a large scale next winter.

Peas and *khesari* after paddy were also found to be a good fodder and specially suitable for grazing. Eleven bighas of tobacco and 18 bighas of potato were also grown during the last winter.

The following crops are now on the ground:—

	Bighas.
Joar and maize for fodder	64
Soybean	24
Cowpea	7
Jute	28
Sugarcane	25

Twenty-two bighas of *aus* paddy has been harvested in addition to the area grown under the *adhi* system.

A much larger area of sugarcane was planted, but unfortunately continued heavy showers of rain immediately after planting damaged a very large number of cuttings which did not germinate at all but rotted on the ground. Only the area which has grown well is shown above.

Trial of new crops.—The following new crops are being tried for fodder:—Soybean, cowpea; Lucerne, Saran *joar*, Darjeeling maize.

Pasture.—One block of 50 bighas has been laid under pasture, but on account of the scanty rainfall, the *dub* has not yet come out very well. Twenty-five bighas around the cattle-shed have been ploughed up and will be put under *dub* as soon as there is a shower. A third block of 50 bighas has been brought under cultivation and put under jute and *joar*. As soon as these crops are harvested, this block will be put under *dub*. A fourth block of about 100 bighas is now being broken up with the Turn-wrest plough and will be put under *dub*. The grass on this block is, however, very coarse, and consists mainly of *ulu*, which may require two seasons to be completely eradicated. The field will be kept under constant cultivation. An attempt will be made to put another 100 bighas under *dub;* but if the unusually severe drought continues, it is doubtful whether it will be possible to do so. All the fallow land, however, is being broken up during the present monsoon.

Implements.—Until the engine-shed is built, the steam-engine and other machinery cannot be used. At present the Turn-wrest plough, chain pump and a chaff-cutter and grinding mill run by bullock-power are all the improved implements in use at the farm. The Meston plough, Planet Junior hoe and various other improved hand tools are also in constant use in the farm. The Turn-wrest plough is being used for breaking up fallow land.

VII.—Staff.

I was in charge of the farm throughout the year. Up to November, I was assisted by one overseer and a clerk. A second overseer was sanctioned in December. An extra overseer on Rs. 30 was also entertained for construction.

The following statement shows the expenditure incurred from the beginning till 30th June :—

	Amount. Rs. A. P.
Capital expenditure—	
Land acquisition	40,089 1 8
Petty construction	32,095 2 3
Reclamation	3,087 11 9
Purchase of machinery and implements ...	703 0 0
Purchase of cattle	9,092 15 9
Miscellaneous and contingencies	3,092 6 6
Total ...	88,160 5 11
Recurring expenditure—	
Establishment	2.772 0 5
Travelling allowance	435 8 0
Total ...	3,207 8 5
Regular contingencies—	
Feed of cattle	7,563 7 0
Seeds, plants and manures	712 4 3
Wages of labourers and goalas	7,266 4 0
Petty repairs	958 13 9
Purchase and repair of furniture	57 12 9
Postage and telegram charges	147 6 6
Purchase of country implements	130 15 9
Railway and steamer freight	653 6 6
Rents and taxes	109 3 0
Unspecified charges	1,399 1 9
Total ...	18,998 11 3

During the first year a good deal of the labour was necessarily spent in clearing small jungle and bringing the fields into a condition fit for ploughing and similar work.

The salary of the Agricultural Supervisor is not included in this.

The sum of Rs. 5,481-10-3 was credited into the treasury up to 30th June 1914.

VIII.—Visits.

The farm was visited in September 1913, by the Hon'ble Mr. P. C. Lyon, C.S.I., Member of the Executive Council of the Governor of Bengal, and by the following officers of the Department :—

The Director of Agriculture	Seven times.
Major Smith, Principal, Veterinary College ...	Twice
Superintendent,* Veterinary Department ...	Five times.
Deputy Director of Agriculture	Four "
Agricultural Chemist	Once.
The Economic Botanist	"

* He was twice accompanied by Mr. McGregor, Bacteriologist.

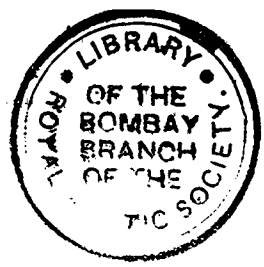
The farm was also visited four times by the Collector, who takes a keen interest in the farm, once by the Registrar of Co-operative Credit Societies, and once by the Inspector-General of Registration.

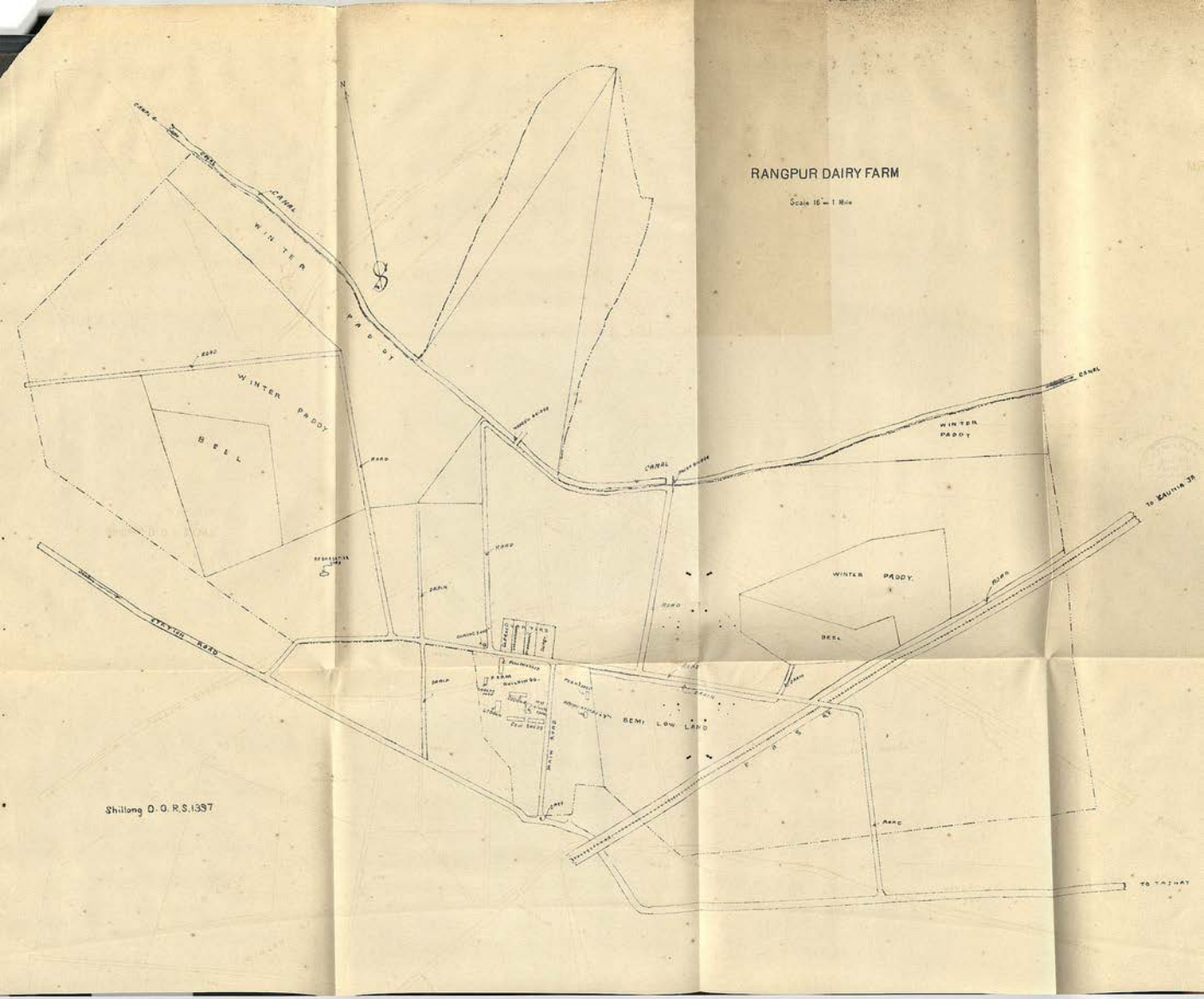
J. N. Chakrabatti,
Agricultural Supervisor.

The 2nd August 1914.

RANGPUR D

Scale 16″=




RANGPUR DAIRY FARM
Scale 16" = 1 Mile
N
CANAL
WINTER PADDY
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ROAD
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WINTER PADDY
BEEL
ROAD
TO KAUNIA JR
SEMI LOW LAND
MAIN ROAD
ROAD
TO TAJHAT
Shillong D. O. R.S.1397

APPENDIX I.

Cropping programme for the winter of 1914.

	Bighas.
Sugarcane (to be planted)	100
Potato	50
Tobacco	50
Vegetables and trial of fodder crops	20
Oats and peas	100
Paddy	150
Mati kalai	50
Total ...	520

ANNUAL REPORT ON SERICULTURAL OPERATIONS DURING THE YEAR ENDING 30TH JUNE 1914.

THE general control and management of the silk operations in Bengal were vested, as before, with the Bengal Silk Committee, consisting of the Director of Agriculture, Bengal (President), the Collector of Murshidabad and three representatives of the principal silk concerns in Bengal. During the year under review, the committee held three regular meetings largely attended by visitors, who are interested in the silk industry.

Administration.—Babu A. C. Ghose, the Superintendent, remained in charge during the year, with a few Nursery Superintendents and Assistant Superintendents, who were left in charge of the Central Nurseries. The Berhampur Central Nursery was left in charge of an Assistant Superintendent under the direct supervision of the Superintendent himself, until the removal of the office and headquarters of the Superintendent to Malda on the 5th November 1913, when Mr. Prabhat Chandra Chaudhuri took over charge of the Central Nursery at Berhampur. It has been proposed to appoint a Nursery Superintendent in each Central Nursery with an Assistant for the disinfection work in the surrounding Joars (rearing villages). The proposal is still pending the sanction of Government.

Tour.—The Superintendent inspected the Central Nurseries very often and spent 239 days on tour. He was deputed to the Punjab and United Provinces in December 1913, and to Bombay and Nagpur in January 1914, to enquire about the silk market, and to find out the causes of its decline in Bengal and to advertise Bengal Silk with samples of all kinds, in order to get more purchasers. He spent 29 days there out of the above 239 days. Since last March the market of Khoongroo Silk has risen from Rs. 16 to Rs. 18 per seer which was never seen within the last 15 years in Bengal.

Nurseries.—The following nurseries existed on the 1st July 1913 :—

(1) Berhampur Central Nursery.
(2) Mirgunj ditto.
(3) Kalitha ditto.
(4) Chandanpur ditto.
(5) Kumarpur Nursery.
(6) Benidaspur ditto.
(7) Mamudpur ditto.
(8) Bogra ditto

Out of the above nurseries Benidaspar and Mamudpur were abolished during the year, and the Kumarpur Nursery has been converted into a Central Nursery. Another Central Nursery at Piasbari in the Malda District has just been completed.

Thus the following Central Nurseries existed on the 30th June 1914 :—

(1) Berhampur (containing 7 rearing houses).
(2) Mirgunj (ditto 6 ditto).
(3) Kalitha (ditto 4 ditto).
(4) Kumarpur (ditto 2 ditto).
(5) Chandanpur (ditto 5 ditto).
(6) Piasbari (ditto 5 ditto).
(7) Bogra Nursery (ditto 5 small rearing houses).

Only the Berhampur Central Nursery was in full working order and the Mirgunj, Chandanpur, Kumarpur, Kalitha and Bogra were under extension. The following houses were built there :—

Mirgunj ...	... 1 Rearing house.
Chandanpur ...	... 2 Rearing houses, 1 Nursery Superintendent's quarters, 2 Sheds for Dallas and Chandrakies and 2 Menials' quarters.
Kumarpur ...	... 1 Rearing house, 1 Nursery Superintendent's quarters, and one Store house.
Kalitha ...	... 1 Rearing house, and one Overseer's quarters.
Bogra ...	... 3 small rearing houses.

At Piasbari 5 rearing houses, 3 Menials quarters, 3 Dalla Chandrakie sheds, 3 Overseer's quarters, 1 seed cutting house, 1 Store house and one Nursery Superintendent's quarters were constructed during the year and about forty bighas of mulberry planted. No rearing work was commenced there.

For another Central Nursery at Amriti in the Malda district, 175 bighas 9 kattas and 8 chattacks of land was acquired with about 25 bighas of mulberry in the year under report. The mulberry plantation is under extension.

At all other places, mulberry plantation was being increased in the proportion of the rearing houses erected.

The object of work of each of the above Central Nurseries, except Bogra, is to rear pure seeds for sale to the rearers of the silk districts in Bengal. The Bogra Nursery has been started to purify Chhotopoloo seed and supply to all the Central Nurseries according to demand.

Supply of seed.—Pure seed free from disease was always reared in all the nurseries and sold to the rearers except in the case of Deshi seed, for want of Bogra Nursery seed. A little quantity of the deshi seed was reared in a hired house at the town of Bogra, which was supplied to Chandanpur Central Nursery, and the result was very encouraging. Mr. DeMinvielle in his letter dated the 18th November 1913, writes as follows :—"The Bachra rearers who had taken Chandanpur Nursery seed, for the Ashin bund, got a very good crop." The total quantity of seed sold during the year was 4179 Kahans and 15 Pons, and the price obtained thereof was Rs. 5,724-5-9.

The total receipt from the outturn of the Nurseries from 1st July 1913 to 30th June 1914, was as shown below :—

	Rs.	A.	P.
Sale proceeds of seed-cocoons	5,724	5	9
„ „ „ cocoons	1,729	11	9
„ „ „ pierced cocoons	179	2	0
„ „ „ rejected cocoons	21	4	6
„ „ „ mulberry leaves	576	4	0
„ „ „ litter	72	8	0
„ „ „ miscellaneous articles	20	15	0
Total ...	8,324	3	0

If compared with the total receipts of the last two years, it appears that there has been a slight decrease in the year under review, which is shown below :—

	Rs.	A.	P.
1911-12	8,052	0	0
1912-13	8,589	10	0
1913-14	8,324	3	0

The decrease noted above is due to the abolition of village nurseries and uprooting of mulberry at Kumarpur and Chandanpur Central Nurseries, where no regular crop could be raised.

Expenditure.—The total expenditure of the Nurseries including the office establishment from 1st July 1913 to 30th June 1914 was as shown below :—

	Rs.	A.	P.
Salaries	4,420	0	0
Travelling Allowance of the Superintendent ...	2,162	11	0
Pay of establishment	16,313	12	6
Travelling Allowance of establishment	2,143	1	6
Stipends	306	6	1
Petty Construction and repairs	41,304	3	7
Cost of Land	17,607	8	11
Rates, Rents and Taxes	1,657	1	5
Rewards to Nurserymen	75	0	0
Cultivation Charges	19,449	0	0
Disinfection of village rearing houses	1,858	9	3
Cost of Microscopes	503	0	0
Miscellaneous charges	18,213	12	7
Total ...	1,26,014	2	10

Training of Rearers' Sons.—During the year, only one student out of 6 passed the final examination from the Sericultural class in the Berhampur Central Nursery and was paid Rs. 250 as reward for constructing a model rearing house. He has completed the construction of the house and is rearing silk worms according to the Pasteur's system.

Disinfection of Village Rearing Houses.—This work was continued for the whole year with success except with the Deshi seed last October from the Berhampur Central Nursery for want of nursery seed from Bogra. Sulphur and Copper Sulphate was sold to the rearers at cost price from the Nurseries attached to the Joars and Supervisors always gave them instructions how to disinfect their houses and to fumigate when necessary. A centre for sale of those disinfectants has also been opened at Malda for the rearers of the district. The total receipts from the sale of Sulphur and Copper Sulphate amounted to Rs. 449-2-9 which was duly credited into the Treasury,

Experiments.—As a preventive of Grasserie, Italian mulberry was cultivated as usual.

A. C. GHOSE,

Superintendent of Sericulture, Bengal

The 18th July 1914.

WORK DONE AT MIRGANJ SERICULTURAL NURSERY FOR THE YEAR ENDING JUNE 1914.

Outturn—

	Kahans.	Pans.	Gandas.	Rs.	As.	P.
Seed-cocoons	937	1	18½	1,263	14	9
Cocoons	825	10	10	481	2	6
Rejected cocoons	136	14	—	52	7	3

Extension.—One rearing house and about six bighas mulberry have been added Ten more bighas are being planted this year.

M. M. CHUCKERBUTTY,

Superintendent of Sericulture.

MIRGANJ,
The 17th July 1914.

REPORT BY THE FRENCH SERICULTURAL EXPERT ON THE EXPERIMENTS MADE AT BABOOLBONA FROM 1ST JANUARY 1914 TO THE 30TH JUNE 1914.

MR. LAFONT had experimented on the crossings between the indigenous and the univoltine races. I did not repeat these experiments. The conclusions have been clearly expounded in the report of Mr. Lafont.

I made a few crossings between the "Accidental Bivoltines" (*i.e.*, the rare worms hatched from an unhibernated cellule) with the Nistaries.

I principally studied the crossings between the polyvoltine of the type of univoltine cocoons and the indigenous races.

I have also been trying to improve the indigenous races by the method of selection. Finally, I have experimented on pebrine which constitutes the principal scourge of the silk-worms and specially that of Bengal.

I have always nourished my worms with the leaves of mulberry planted according to the prevalent system of Bengal so as to place myself in the same condition which the silk-worms shall undergo at the rearer's houses. I venture to add that my leaves have often been worse than those of the rearers' house because I have to commence a new rearing every fifteenth day on account of the great number of different crossings for experimenting thus compelling me to cut my mulberries more often. The leaves of mulberry trees were very rarely used by me except only for particular experiments. This system of conducting my experiments has no doubt caused some loss but that imparts an additional significance to the success obtained in my experiments.

Moreover, I always experimented on a sufficiently large number of worms—50 to 100 layings—of each crossings in order to avoid mistakes. To estimate the value of the cocoons I had one kahan of each variety reeled at Mr. DeMinvielle's who had very kindly conducted several experiments at Ramnugger. I had also some reeled at Baboolbona according to the Bengal system. There may be a little difference in the silk thus reeled but the quantity of produce is always the same. I have compared the results obtained by Mr. DeMinvielle with mine and the difference is insignificant.

The weight of the silk and the weight of the floss were taken in tolas. On adding these two weights we obtain the total weight of the silky matter less the small quantity of silk lost with the "Basinees." This weight ought to be considered as the proportions

of silk and the floss depends on the reeler, the preparation and on the mode of the boiling of the cocoons etc.

I shall give in this report only those results which will lead to practical results.

Influence of feeding on the Richness in Silk.

To explain the results obtained it is necessary to show what is the influence of food on the richness of silk.

In the Bengal system of mulberry cultivation, the leaves are sometimes hard and sometimes tender as it rains or not.

Worms of all varieties yield cocoons rich in silk when fed on hard leaves specially during the last stage. The following numbers will demonstrate this fact :—

Weight per kahan of cocoons.	Rearing in January made with sufficiently consistent leaves.	Rearing in February made with tender leaves.	Rearing in April made with consistent leaves.
		Crossing Madagascar No. 1.	
Silk	8	6	9½
Floss	2	3	4
Total ...	10	9	13½
		Crossing Madagascar No. 2.	
Silk		7¼	9½
Floss		2	4
Total ...		9¼	13½
		Pure Nistari.	
Silk		4	7
Floss		2	2
Total ...		6	9

One notices easily that the difference is very important both for the indigenous races and the crossings. Owing to food the richness in silk is greatly diminished even in the good season. Fed with tender leaves the pure European races die of Grasserie and the pure Madagascars die in the proportion of 80 per cent. So that in comparing the value of different varieties it is necessary to consider the results obtained by the worms fed with the same leaves.

Experiments on the crossings made with improved polyvoltine races and the indigenous races.

I worked with the following races :—

Race A.—Pure Madagascar giving very big cocoons. This race had undergone two generations in Bengal in the cold season. It is this variety which gives the largest cocoons and the biggest worms. The cocoons are double in size of those of Italian by Japanese. But the voyage during which the worms hatch out in the route greatly weakens the race. A great many of the worms die of Flacherie during the rearing and the cocoons are far smaller than those obtained from the same race in Madagascar. The eggs change colour the day after the laying of eggs similarly as those of the univoltine.

Race B.—Crossing of a pale yellow race of Madagascar which I had sent to Mr. Lafont from Madagascar with female Nistari. On my arrival at Baboolbona I found them at the seventh generation. Most of the worms are striped.

Race C.—Crossing between the male of race B and the Nistari female.

On my arrival at Baboolbona these were at the sixth generation. The same remark as for the race B. This race showed itself to be less acclimatised than the preceding one although containing more Nistari blood. Undoubtedly this is owing to the fact that this was obtained from the same laying and the effect of consanguinity had greatly weakened the race.

THE INFLUENCE OF CROSSING ON HATCHING.

First case.—Crossing between A (female) pure Madagascar and Nistari male.

This crossing does not give more than 25 per cent. of hatching out at the first generation. The same result is obtained at the second generation. This fact is surprising. It seems that the crossing reveals the ancestral character of the Monovoltine lost since 50 generations. In fact, the polyvoltine race of Madagascar originates from a crossing between a polyvoltine and a univoltine. The second generation gives 50 per cent of hatching, the third is polyvoltine.

Second case—Crossing between A (Madagascar pure) male and Nistari female.

The first generation is entirely polyvoltine. The second gives the following hatchings taken from four representative layings.

	First Day.	Second Day.	Third Day.	TOTAL.
First	139	200	50	389
Second ...	183	180	55	418
Third ...	166	162	45	373
Fourth ...	122	180	62	364

There remains about 50 to 100 eggs. But on rearing the worms hatched on first two or three days one obtains more worms than with one laying of pure Nistari. We can therefore distribute this cross race to the rearers from the commencement. The third generation gives still better hatching. The crossings B and C were perfectly Polyvoltine whatsoever might have been the mode of the change of colour of the eggs. The same remark applies to the crossings derived from B and C.

INFLUENCE OF CROSSINGS ON THE RICHNESS IN SILK.

I am giving in the following table the richness in silk of the cocoons obtained from the different crossings taking into consideration those only which were reared at the same time and with the same leaves.

First.

Nistari female (richness in silk, 9 tolas per kahan.)	By A (Madagascar pure) 17 tolas per kahan (a).	Gave a crossing yielding 20 tolas of silk per kahan.

Second.

Race B, Male (13½).	By Nistari female 9.	Gave a crossing yielding 15 tolas of silk per kahan.
Race A, Male (13½).	By Race B, Female (11½).	(13½).

(a) Here the maximum yield is given by weighing the silky shell.

The examination of these numbers demonstrates this curious and interesting point of practical utility.

The crossing between an indigenous race (female) and an ameliorated race already reared in Bengal which consequently resembles the type of indigenous female by ameliorated male, give cocoons richer in silk than those obtained from the pure ameliorated race. This difference is all the more apparent when the difference between the parents is more. It appears that the crossings reveal the latent quality of the father. The crossing No. 2 is particularly interesting. It shows that this law holds good even for the varieties obtained by a crossing which has been rendered old by several rearings in this country, the method of selection being always adhered to.

The following generations preserve their richness in silk until the climate is favourable but like all the ameliorated races they lose little by little their richness in silk while traversing the rainy season. We can then supply to the rearers good seed-cocoons which will yield better cocoons than the Nistaries during several generations. In the good season they will profit by the first generation which yields more than double the quantity of silk.

INFLUENCE OF CROSSING ON THE SIZE OF THE WORMS.

The size of the worms follows the variations of the richness in silk. The worms of the crossings are bigger than the biggest of the worms used for the crossing.

Influence of Crossing on the Rusticity of Worms and resistance of the Crossing to the Climate.

The indigenous worms are evidently best adapted to the climate. They resist best the Grasserie and the Flacherie and also the worst climatic influences. At this epoch we can only rear effectively with these although the rearing is quite mediocre but it enables us to utilize the mulberry leaves.

The crossing A female by Nistari male of the first generation, although more resistant than the pure Madagascar shows itself less able to resist the heat in May. The second generation has greater powers of resistance since in June I obtained more cocoons than in May. The crossing Nistari female by A male (first generation) is also equally resistant as the pure Nistaries. The second generation is less capable of resistance and the capacity seems to be a mean between the capacity of the father and that of the mother. These crossings will give very good results up to June. Certainly they will succeed very well from October and June resisting quite nicely both the climate and the tender food. In the good season the pure Madagascar nourished with the tender leaves die of grasserie to the extent of 95 per cent. Crossed with the Nistaries they yield in June with the bad leaves about 45 per cent. of good cocoons. It sufficed to nourish the worms with tender leaves at the last stage for diminishing grasserie. No species of pure worms whether polyvoltine or univoltine similarly rich in silk can yield a single cocoon under the same conditions of temperature and nourishment. From the month of June, grasserie is an obstacle to the rearing of the crossings B which fared quite well up to May, being quite resistant to the grasserie although nourished with tender leaves. It was almost destroyed at the end of June by that disease. Consequently, to avoid this disease it was necessary for me to restrict myself to rearing the Nistaries only during the rainy season. But from October to June these crossings are to be preferred to whatsoever pure race.

For the resistance to pebrine it is difficult to say definitely. It is impossible to be certain whether the worms had been placed in the same conditions or whether they have consumed the same quantity of germs. I conducted a few rearings without previous examinations of the moths so as to ensure pebrine. The crossings had always been less pebrinised than the pure races. It appears then that they are more resistant to this disease.

Influences of Selection on the Crossings.

I applied methodical selection to the crossings B which had undergone five generations in Bengal without any selection.

I selected in point of view of the form and the colour of the cocoons as also of the colour and the rusticity of the worms. I selected both according to the families and individual. I derived from pale yellow cocoons of irregular forms more regular cocoons of univoltine types. I preserved the pale yellow colour but I also obtained a golden yellow variety of cocoons resembling the colour of the Nistaries. This species requires a few more generations to be perfectly uniform. Finally, I have been able to eliminate completely the striped worms which seem to be disliked by the rearers. Nothing therefore is easier than to create by proper methodical selection the varieties adapted to the taste of the natives.

I have also selected at the same time in point of view of the richness in silk and the crossing B which gave 11 tolas of silk per kahan at the seventh generation yielded 13½ tolas at the ninth generation. It is probable that the good effects of selection shall not last during the rainy season.

Crossings made with accidental Bivoltines.

When one preserves for a certain period the eggs of the univoltines which have not been subjected to the action of cold, one obtains a few rare and irregular hatchings. It is these worms which I call by the name of accidental Bivoltines. We know from the report of Mr. Lafont that if we cross a univoltine male with a polyvoltine we do not almost get any hatching at the second generation. But if we employ the accidental Bivoltine worms the second generation gives 50 per cent. hatching and the third is completely polyvoltine. We can thus create polyvoltine races in two generations only. With the help of this process we can experiment in creating by crossings with several good univoltine races several polyvoltine races which will furnish the males required for the crossings. The Madagascar shall not then be the only variety available. They are inconvenient to be brought to Bengal as they become weakened during the voyage. In fact their polyvoltinity interdicts us from bringing them in the state of eggs.

Experiments with a view to the improvement of the richness in Silk of the indigenous races.

It is known that certain races of silk-worms can be ameliorated by selection whereas others are completely refractory. The experiments of Mr. Lafont on this question are well-known.

In what category should we then place the indigenous race? I have already commenced selecting by weighing the silky shell and choosing the cocoons weighing most. I am at the fourth generation with the nistaries and at the second generation with the chhotopoloo. But we cannot definitely conclude without rearing for a great many generations and then comparing the results with these obtained during the previous years

For the present 1 kahan of my pure nistaries gives 9 tolas of silky matter (7 tolas of silk and 2 tolas of floss). It seems that there is already an improvement, but I fear that the effects of selection may be destroyed during the rainy season. I have sent some of these to Shillong, probably it may be worthwhile to send a little in a mountain. This will serve in avoiding the diminution of silky matter and will at the same time add more to the rusticity (hardiness, etc.) of the worms.

CONCLUSION.

I think a considerable improvement on the quality of the cocoons can be effected during the period from October to June. To produce the best and the richest cocoons in the rearers' houses at that period we should also place ourselves in the same conditions as in their houses in order to avoid changing the manner of rearing.

A cheap and economic means of producing the seed-cocoons in large quantities should be found out. The rearers do not like to buy eggs. So that, we shall have to deal in seed-cocoons which should supply us with worms satisfying the following conditions :—

(i) Should be sufficiently resistant to the climate.

(ii) Should be habituated to the leaves.

(iii) Should be polyvoltine in order to enable the rearers to continue their rearings.

Let us hope that one day the rearers will give up producing their own seeds because otherwise they only help in propagating pebrine. For the present, they will not like to have any seeds, the outturn of which cannot be sold as seed-cocoons. It is impossible to have an improved race which will resist such changing climatic conditions. The races which can be created shall only remain confined within the laboratories and consequently shall not be of any practical utility. Besides, we should always select according to their richness in silk and rusticity (hardiness, etc.) as is done everywhere for the improved races. If the indigenous races can continue rearing without degenerating the race, it proves that they have nothing more to lose. There is no poorer race in silk available. If I am to improve it I must adopt the method of selection. It has been proved by my experiments that this difficulty may be avoided by profitably employing the system of crossings, whereby the vigour as well as the richness in silk for a certain number of generations is ensured. If it is impossible to distribute the crossings of the first generation to the whole of Bengal, it will be very easy to furnish the Government nurseries at that period so as to supply the second generation to the rearers. We shall thus furnish the rearers with seed-cocoons resembling the nistaries to which they are habituated ; but at the same time richer in silk. Their polyvoltinity makes it possible to make several rearings up to June.

We shall preserve our pure indigenous races for making our crossings and for rearing during the rainy season and we shall also keep an ameliorated race which shall supply us with the required number of males. It remains to find out the best polyvoltine ameliorated race which when crossed with the nistaries shall be the most rustic variety. These races can by themselves be taken from the crossings with the indigenous races which will approach the type of ameliorated univoltine races by the method of selection. It shall be neccssary to avoid degeneration during the four bad months by sending them to a small station in the mountain. From October to April the crossings yielding very beautiful cocoons shall be distributed. In the rainy season we shall have to satisfy ourselves with the races less rich in silk but highly rustic—preferably the ameliorated nistaries. Before undertaking to adopt my experiment, one ought to enquire whether this system will necessitate a good deal of expenditure. This will not require any changes to be made in the existing system except in the preparation of the seeds for the Government nurseries. It shall no longer be necessary to continue that detestable practice of obtaining the reproductors from the rearers' houses. We shall no longer require the "change of locality" for the worms (the change which is not so important as we hear) as the crossings will be more efficacious. We shall be able to prepare in one place the seeds for all the Government nurseries and thus the important operation of grainage shall be easily controlled and supervised.

The only expenditure required will be the creation of a small station in a mountain. It shall be necessary to have sufficient accommodation for rearing the number of males required for the preparation of seeds for reproduction. One male can fecundate three females. One kahan of cocoons contains about 640 males. One kahan of cocoons shall thus be sufficient for 1,920 layings. We can possibly consider one-fourth as the probable loss. This proportion shall not be exceeded as in serving for the purpose of reproduction the pebrinised lots should never be used. The indigenous races destined for that use ought to be reared separately and surrounded with care. This calculation shows that we can count on 1,440 cellules (layings) per kahan of cocoons of the ameliorated race. The worms of the crossings are bigger and consequently we can expect to place as many of them as those of the nistaries in the same magnanerie (Rearing House). At the same time these layings are of more value since they will produce double the quantity of silk. It is necessary to count from 1,200 to 1,500 layings. Thus eight kahans of cocoons shall be sufficient to furnish the males necessary for the Central Nursery. So that taking 150 kahans for all the nurseries of Bengal we are above the real situation. Consequently, the required station shall be a very small magnanerie (Rearing House)

slightly larger than a rearing house of a Central Nursery. Thus there will not be much difficulty to undergo in the carrying out of this plan. We shall employ the Madagascar races yielding the cocoons of average size, the crossings of bivoltine Japanese and the accidentally bivoltines of small worms in order to find out the best race of the type of the univoltines for the crossings. The results obtained from the Madagascar races will enable us to produce on a larger scale if I can possibly commence rearing from now a small quantity of these in the mountain.

The Pebrine.

This is the most redoubtable of all the maladies of silk-worms. The rearers are familiar with the other diseases causing losses. They are accustomed to the losses from flies and muscardine which come in seasons known to them. But with pebrine the rearers have to be discouraged since it pervades in all seasons without their anticipating it even when they obtain seeds from seed-cocoons which had spun very well. It is this which constitutes the principal cause of the progressive disappearance of sericulture and which will end in the total destruction of this industry if the fault is not cured. It is therefore quite natural that I should consider this in my experiments. I shall submit at the end of the year a detailed report on this important problem. In that case, I shall be able to see the rearing in this country for the whole of the year. I ought to point out at present that I have not found anything which is unlike that of the other countries in the case of this disease and also that it follows the developments of the worms specially when it lasts for months. One can obtain a crop from a pebrinised laying if one does not rear in large quantity in a perfectly ventilated chamber. I cannot understand why pebrine should not be considered so dangerous in Bengal. But it suffices to witness the rearing at the rearers' houses where everything helps to increase the growth of this disease (crowded worms, insufficient ventilation, delitage done without proper care). This is fatal to the success of a crop. Therefore with the seeds free from pebrine, that disease is less to be dreaded. The natives cannot prepare good seeds except one or two big rearers who, I understand, have adopted the system of Pasteur. It is indispensable that the seeds of the Government nurseries should be free from pebrine. As soon as the rearers will note the superiority of these seeds by the success of their crop they will not go elsewhere in search of seeds. It is this which happened in Madagascar where without any disputation private grainages (seed supplying establishments) have totally disappeared.

E. Grangeon,

Professor, Sericulture Research, Berhampore.

ANNUAL REPORT ON THE WORKING OF THE SERICULTURAL SCHOOL, RAJSHAHI, FOR THE YEAR ENDING 30th JUNE 1914.

The school was started by the Diamond Jubilee School Committee in January 1898 with a view to impart a sound practical scientific training which might help the people to develop the various departments of the silk textile industry in Bengal. As the scheme met with the approval and support of the Government of Bengal, the institution was made over by the promoters to the District Board, Rajshahi, which managed and maintained it till the end of the year 1906.

The school was made over to Government in January 1907, since then it is being managed by a Managing Committee under the direction of the Director of Agriculture.

The Committee consists of the following members :—

(1) Chairman, District Board, Rajshahi.
(2) Rai Kumadini Kant Banerjee Bahadur, M.A.
(3) Secretary, Rajshahi Association.
(4) Secretary, Muhammadan Association.
(5) Maulvi Syed Jaffazul Hossain.
(6) Babu Kisori Mohan Chaudhuri.
(7) Rai Kedar Prasanna Lahiri Bahadur.
(8) Maulvi Wajuddin Ahmad.
(9) Babu Panchanan Newgy.
(10) „ Mohendra Kumar Saha Chaudhuri.

During the course of the year under report the Committee have lost the valuable services of Dr. Chandra Nath Chaudhuri and Babu Haran Chandra Banerjee, who was also the Secretary of the School Committee by their sad death in August 1913 and May 1914.

The school teaches practical methods of—

(*a*) Mulberry cultivation.
(*b*) Microscopic seed selection.
(*c*) Detection and prevention of silk-worm diseases.
(*d*) Rearing of Indian silk-worms.

The school has in possession 22 bighas of land at Kadirganj within a mile of the school. Of this 15 bighas are under mulberry cultivation against 8 bighas of the previous year.

Small plots of 2 cottahs each have been made over to each boy for growing mulberry. They will cultivate these plots themselves and the leaves grown will be measured and weighed. The result will be taken into consideration at the final examination.

The cocoons grown in this school are gaining popularity among the Bashnis. They take cocoons from this school for their seeds.

Five crops of cocoons were raised in the school in the year under report, namely, in September, November 1913, January, April and June 1914, amounting to 213 kahans of cocoons of which 10 kahans were kept for microscopic examination in the class and the rest was sold as sanchas to the Bashnis of different joars of this as well as of Malda district. The total receipt was Rs. 427 against Rs. 209 in the previous year.

Teaching staff.—There is a Head Master who teaches sericulture and with the help of a rearer practical rearing is taught. The Head Master from time to time visited the model rearing houses of passed students and gave instructions to the village Bashnis regarding silk worm rearing.

Model Nurseries.—Model nurseries have been started by the ex-students of this school and arrangements have been made to inspect the nurseries and to see how they make profit by rearing silk worms.

Students.—There were 11 boys in the beginning of the year under report ; eight of whom appeared at the final examination and five passed in the examination held in December 1913. The new session commenced in January 1914 with a number of 12 boys on the roll. At present there are 11 boys of whom nine are Hindus and two Muhammadans.

There were 22 microscopes ; one of which was given to an apprentice ; of the remaining 21, nine are unserviceable.

The half-yearly examination of the apprentices was conducted by the Superintendent of Sericulture, Bengal, the result of which is not yet out.

Rewards.—Only Rs. 150 second instalment money was paid to Lalit Mohan Das, a passed student of the previous year. None of the passed students of the year under report have received rewards for construction of model rearing houses. These will receive their rewards in the next winter.

Discipline.—No case of serious breach of discipline came to the notice of the school authorities during the year under report.

Receipts—	Rs.	*Expenditure*—	Rs.
Sale proceeds realised and credited into the Treasury	427	Establishment	807
Government	4,273	Stipend	940
		Appliances	60
		Books and maps ...	20
		Repairs to buildings ...	518
		Rewards	150
		Taxes, etc.	123
		Contingencies	2,082
Total ...	4,700	Total ...	4,700

The school was visited by—

The Superintendent of Sericulture, Bengal, on 16th July 1913 and 22nd August 1913.
The Director of Public Instruction, Bengal, on 14th August 1913.
„ Hon'ble the Nawab Syed Samsul Huda, on 20th January 1914.
„ Director of Agriculture, Bengal, on 22nd January 1914.
„ Commissioner, Rajshahi Division, on 7th February 1914.

There were altogether seven meetings of the Managing Committee.

K. BANERJI,

Secretary, Sericultural School, Rajshahi.

RAJSHAHI,
The 7th July 1914.

WEAVING MASTER'S REPORT.

DURING the year ending with 30th June 1914, I availed myself of casual, privilege and sick leave amounting to 116 days in and I had been out on tour for 301 days to attend to works as detailed below :—

I visited the district town of Mymensingh, where I had to get a "spinning and doubling machine" constructed with the help of the local Kashi Kishore Technical

School. The "spinning machine" is intended for automatically converting the pierced cocoons into spun thread called *mutka* and the doubling machine is to twist together two or more continuous strands of reeled silk while used as orgazine or warp threads. The spinning of *mutka*, which is purely a domestic industry among the silk rearers of Bengal at present, is done, either with a *churka* and distaff or with a top spindle, the spinners being chiefly the female members, who carry on the work during their leisure hours. Both the abovementioned operations that are in vogue are found to be very slow and tedious and consequently they do not pay for the labourer at all. The demand, therefore, for such improved spinning and doubling machines in all the silk-rearing centres is very great. Costly machines are beyond the means of the rearers and weavers to purchase. The machines under construction being unique ones, and constructed at a minimum cost, so as to suit the requirements of spinners and doublers, require complete testing before they are introduced among them. I visited Tangail in order to inspect the weaving school organized and started by me and I found that the Local Board and the neighbouring weavers have begun to appreciate its existence there.

I visited the following places, namely, Malda, English Bazar, Ferozpur, Mahispur, Kaliachuck, Sibganj, Shujapur, Amanjganj Hât and Jalalpur, all in the district of Malda, and demonstrated in each of the places an improved pattern of silk-reeling machine, that was constructed by me for the use of silk-reelers. The reeling machine that is at present used by the silk-reelers has got wooden tooth wheels to transmit motion to a guide-shaft placed in front of the swift. The right-hand end of the guide-shaft loosely slides in a hole made on a vertical support and the other end is eccentrically pinned on the flat surface of a toothed wheel. By rotating the swift, the left-hand end of the guide-shaft is given an eccentric motion causing the other end simply to slide loosely on the vertical support; and while cocoons are reeled, the fine strands that pass through the guide hook are given sudden jerks owing to the eccentric movement of the guide-shaft and thereby constant breakages occur. Besides this, the toothed wheels being wooden, are worn out very soon and a recurring expenditure is too frequently incurred in repairing them. The improvements of the newly-constructed machine consist in eradicating those practical drawbacks. Toothed wheels were done away with and replaced by two suitable rope pulleys, which are connected with an endless rope. With regard to the other drawback, the pinned end (left-hand end) of the guide-shaft was also given a vertical support similar to that of the right-hand one, and by fitting, a metal-plate having an elongated slot at right angles to the guide-shaft and adjusting it to the flat surface of the rope pulley by a pin that loosely slides within the slot, the eccentric motion of the guide-shaft is converted into a reciprocally sliding one. The movement of the guide-shaft being made very regular and uniform, a very small strain is put upon the reeled strands and hence there are less breakages. This improved machine, constructed first at Malda, was found quite useful to reel fine as well as coarse deniers of silk thread, varying from 2 to 30 cocoons reeling at a time. It was tested by the Malda reelers and appreciated very much as to its improvements and accurate working facilities. The filature reelers also have begun to introduce the same in their filatures. I visited the weaving centres of Sibganj and Kalichuck and demonstrated the fly-shuttle loom and its improved accessories to the weavers. At the request of the District Board of Malda, a reeling machine was constructed locally and erected in the local weaving school, so that it might be kept as a model machine for the outsiders who wanted to see its working.

I visited Katakali, Dholghat, Baalkali, and Sitakundu in the district of Chittagong and demonstrated to the weavers the advantages of adopting automatic fly-shuttle looms, as the weavers there stood in great need of such improved ones. I, therefore, arranged with the loom makers of Ludhiana to supply them with the necessary accessories.

I visited Feni, Bairagi Hât, Dhagonbuya, Purvachandrapur and Azizfazilpur in the district of Noakhali, and demonstrated to the weavers of the respective places, the working of the automatic loom. Two weavers from each of the places were trained in the use of the loom and the improved warping apparatus, so that they might start the business with little difficulty, when the new loom arrived. As they very much liked their working, they ordered for similar looms and warping apparatus.

I visited Comilla, Manamati, Barkanta, and Nawabpur in the district of Tippera and inspected the working of the weavers in the respective centres, where demonstration had been already conducted by me on a past occasion and gave them further instructions regarding improvements in the preparation of warp and mounting of healds for weaving designed fabrics on 4 to 6 shafts, and demonstrations in their practical details.

I visited Berhampur, Ramnagar, Chandanpur, Beldanga, Soampara, Mahadipur, Jayakrishnapur, Dhopukria, Saktipur, Jankipur and Mirzapur in the district of Murshidabad and demonstrated my reeling machine to the high appreciation of the reelers, who adopted it. The filature owners of Soampara, Beldanga, Dhopukria, Jayakrishnapur, Siktipur and Jankipur, and the Ramnagar filature owned by Mr. DeMinvielle, universally appreciated the working of the machine and constructed model machines for their future works. During my later visits, I found them adopting it, replacing the improved ones to those that went out of order.

I visited Nawabpur, and Tatibazar in the district of Dacca, where I had already conducted demonstrations on a past occasion, and as the weavers desired me to get for them *swadeshi* automatic looms and to construct an improved warping apparatus for their use, I arranged accordingly with the loom makers to supply them the necessary looms and gave specifications and plan of the improved warping apparatus, so that they could construct it locally.

I visited Bharenga in the district of Pabna, in connection with the reorganization of a weavers' co-operative society and in accordance with the instructions received from the Registrar of Co-operative Credit Society to inspect and report how the society worked, I visited the place and found the members of the society scattered here and there, as their houses had been washed away by the Jumna river. In a meeting held at Pingna, the members were present, and as they stated that they would work up the society more vigorously as soon as they settled, I reported the matter to the Registrar and recommended that it should be dissolved.

I visited Thalma, Bhanga, Paschimshadardi, Nurpur, Hathuria, Gossainhat, Idilpur, Rajbari, and Burirhat, in the district of Faridpur, in connection with the organization of fresh weavers' co-operative societies and demonstrated the improved loom and use of its accessories to the weavers (members). New societies were organized at Bhanga, Paschimshadardi and Idilpur. I made arrangements to start similar societies at Rajbari, Burirhat, and Nurpur.

N. NARAYANA PILLAI,

Weaving Master.

REPORT OF DEMONSTRATION WORK, DACCA DIVISION.

Staff.—One agricultural Supervisor for the Division, one District Agricultural Officer, for Mymensingh, and 28 Fieldmen Demonstrators as noted below:—

Mymensingh	...	...	...	...	20
Dacca	...	...	...	...	4
Faridpur	...	...	...	...	3
Barisal	...	...	...	...	1
			Total	...	28

On account of the expansion of the work in the other districts, services of two other officers were also allowed—about the latter part of the year under report during May and June—one for Dacca and the other for Faridpur and Barisal.

Demonstrations.—The work undertaken in the different districts is detailed below:—

Dacca	...	(1) Bonemeal on winter paddy.
		(2) Introduction of the cultivation of potatoes.
		(3) Conservation of cattledung and urine.
		(4) Plant to plant selection of paddy and jute seeds.
		(5) Introduction of superior varieties of sugarcane.
		(6) Advantage of using the Meston plough in light soils and the Planet Junior hand-hoe for interculture.
Mymensingh	...	(1) Bonemeal on winter paddy.
		(2) Introduction of the cultivation of potatoes.
		(3) Conservation of cattledung and urine.
		(4) Plant to plant selection of paddy and jute seeds.
		(5) Advantage of using the Meston plough in light soils and the Planet Junior hand-hoe for interculture.
Faridpur	...	(1) Introduction of the cultivation of potatoes.
		(2) Conservation of cattledug and urine.
		(3) Plant to plant selection of paddy and jute seeds.
		(4) Advantage of using the Meston plough in light soils and the Planet Junior hand-hoe for interculture.
Barisal	...	(1) Introduction of the cultivation of potatoes.
		(2) Conservation of cattledung and urine.
		(3) Plant to plant selection of paddy and jute seeds.
		(4) Advantage of using the Meston Plough in light soils and the Planet Junior hand-hoe for interculture.

Bonemeal on winter paddy.—Repeated experiments have proved that bonemeal is a very good manure for transplanted winter rice. To demonstrate the advantage a few plots belonging to cultivators around the Dacca Farm were treated with bonemeal and grown with winter paddy. The results were so very convincing that there was a large demand for bonemeal next year. A Co-operative Bank was started at Mahakali, mainly to find money for the purchase of bonemeal. Everywhere the demonstrations proved successful. During the year under report 506 plots (Dacca 30, Mymensingh 476) were treated with bonemeal. Of these, seven were sown with *aus* and the rest with transplanted winter rice. Results, which have proved successful in every case, will be found in Appendix I.

As the effect of bone remains in the soil for at least three years, cultivators are getting equally good results in the plots treated with bone three years before. Requisitions for bonemeal are increasing every year, which proves the usefulness of this demonstration work. Orders for the supply of about 800 maunds of bonemeal have been received from cultivators this year.

Potato.—This is practically a new crop to this part of the country. Demonstrations to the effect that this crop can be grown with advantage in the alluvial tracts of the district are being given since the last three years. In every case good results have been obtained, and orders for seed-potatoes from cultivators of places where demonstrations were once given have been received in large quantities. During the year under report 166 cultivators took and grew seed-potatoes supplied by the department. The results, which are quite encouraging in every case, will be found in Appendix II. Orders for over 1,000 maunds of seed-potatoes have been received this year from cultivators of this Division alone.

Conservation of cattledung and urine.—Very little care is generally taken by cultivators to conserve their cattledung properly, while the urine and other refuses from the cattle-shed are altogether neglected. The common practice is to stack the dung in the open, exposed to sun and rains, whereby the ammonia, the best part of the manure, is altogether lost. Endeavour is being made to show the cultivators how to keep it best with the least cost. The method is to dig a pit and raise a small inexpensive shed over it just to protect the manure from the sun and the rains. In low, wet places, however, where the water-level is very near, instead of digging a pit a reservior may be made by raising small walls around the posts of this shed. The sides or walls of this pit or reservoir and the bottom are to be plastered with mud and cowdung to make the same as impervious as possible. Into this pit or reservoir all the manure, viz., the dung, the surface earth of the floor soaked with urine and other refuses, even sweepings from the houses or the yard are to be thrown every morning. The whole stuff is then to be spread and well rammed with the back of the *kodali*. When one such pit or reservoir is full a new one may be made and used for conserving the manure. In this way quite a good quantity of very rich manure can be secured by cultivators without any appreciable expenditure.

In over 500 such pits the advantage of this easy and inexpensive system of conserving manure is being shown to cultivators. Its value is being already appreciated and the number of pits increasing.

Distribution of superior variety of sugarcane.—In the Dacca Farm very good results have been obtained from canes of foreign varieties. It would be a boon to the country if these canes could be introduced but the stock is yet very limited and only 2,000 cuttings could be distributed last year to selected cultivators around the Dacca Farm. These are doing very well and a very good yield is expected. This year a still larger quantity will be distributed among cultivators.

Selection of seeds.—Cultivators are generally very careless in the matter of their seed selection. Although they all know that best plants give best seeds, they take little or no care while actually preserving their seeds. Best plants are being selected in cultivators' fields and marked down, which are left for seeds when the crop is harvested. Last year such seeds were selected in Mymensingh and Dacca, the superiority of which has been shown side by side with seeds as ordinarily kept by cultivators. The results (in every case of jute; those of paddy seeds will not be available till January next) have been quite convincing, as will be found in Appendix III.

Encouraged by the above results, this year this selection work has been expanded over all the four districts in the Division. Such selection work has been done in over 300 plots. Cultivators seem to understand the value of the system, and it is hoped they will take to it with zeal and earnestness.

Implements.—Every demonstrator in the Division has been provided with a Planet Junior hand-hoe and a Meston plough. The advantage of the former for interculture and of the latter for cultivating light soils are being demonstrated with good results, and orders are being received for their supply in consequence.

R. DAS GUPTA,

Agricultural Supervisor.

Effect of Bonemeal on Autumn (Aus) paddy.

District Dacca.

Subdivision Sadar.

Cultivator's Name and Address.	Area.		Manure.		Outturn.		Difference.		Profit per acre.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	B. K. H.	B. K. CH.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Hari Charan Mondal ...	0 10 0	0 10 0	0 20 0	1 8 0	4 2 0	3 13 0	0 29 0	1 7 3	.....
Peary Mohan Mondal ...	0 7 0	0 7 0	0 14 0	1 0 9	2 19 0	1 28 0	0 31 0	0 12 3	.....
Raj Mohan Sarkar ...	0 10 0	0 10 0	0 20 0	1 8 0	5 33 0	3 18 0	2 15 0	4 12 0	19 8 0
Pitamber Mondal ...	0 10 0	0 10 0	0 20 0	1 8 0	3 16 0	2 11 0	1 5 0	2 4 0	4 8 0
Nurali Mondal ...	0 10 0	0 10 0	0 20 0	1 8 0	4 21 0	3 11 0	1 10 0	2 8 0	6 0 0
Dangar Mondal ...	0 7 0	0 7 0	0 14 0	1 0 9	3 8 0	2 0 0	1 8 0	2 6 3	11 9 0
Shashi Kumar Sen Khilgaon.	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 10 0	1 30 0	3 8 0	1 8 0

Transplanted winter (sali) paddy.

District Dacca.

Subdivision Sadar.

Hari Charan Mondal, Chatar.	0 10 0	0 10 0	0 20 0	1 8 0	3 21 0	2 12 0	1 9 0	2 7 3	5 11 6
Piary Mohan Mondal, Chatar.	0 7 0	0 7 0	0 14 0	1 0 9	2 19 0	1 37 0	0 22 0	1 1 6	.....
Raj Kumar Sarkar, Chatar.	0 10 0	0 10 0	0 20 0	1 8 0	3 8 0	2 5 0	1 3 0	2 2 5	3 14 6
Pitambar Mondal Chatar.	0 10 0	0 10 0	0 20 0	1 8 0	3 11 0	2 5 0	1 6 0	2 4 9	4 12 0
Nurali Mondol, Chatar	0 10 0	0 10 0	0 20 0	1 8 0	3 2 0	2 2 0	1 0 0	2 0 0	3 0 0
Dangar Mandol, Chatar	0 7 0	0 7 0	0 14 0	1 0 9	2 7 0	1 17 0	0 30 0	1 8 0	3 14 1
Sashi K. Sen, Khilgaon	2 0 0	2 0 0	2 0 0	6 0 0	10 30 0	6 20 0	4 10 0	8 8 0	3 12 0
Yakub Khan, Khilgaon No. 1.	1 0 0	1 0 0	1 0 0	3 0 0	7 12 0	5 11 0	2 1 0	4 0 9	3 2 3
Ditto No. 2.	1 10 0	1 10 0	1 20 0	4 8 0	7 21 0	5 3 0	2 18 0	4 14 6	0 13 0
Ebrahim, Khilgaon ...	1 0 0	1 0 0	1 0 0	3 0 0	6 9 0	4 13 0	1 35 0	3 12 0	2 4 0

District Dacca.

Subdivision Sadar.

Ram Sankar Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	7 21 0	4 10 8	3 10 8	6 8 6	10 9 6
Krisna Monan Mondal	1 0 0	1 0 0	1 0 0	3 0 0	5 30 4	3 25 0	2 5 4	4 4 2	3 12 6
Sheik Shagir Dafadar	0 10 0	0 10 0	0 20 0	1 8 0	4 15 0	2 30 4	1 24 12	3 3 8	10 6 0
Sheik Kerali ...	1 0 0	1 0 0	1 0 0	3 0 0	8 15 0	5 5 0	3 10 0	6 8 0	10 8 0
Sheik Manik Khan ...	0 10 0	0 10 0	0 20 0	1 8 0	3 35 0	2 17 0	1 18 0	2 14 5	8 6 6
Panch Kari Mondol ...	0 10 0	0 10 0	0 20 0	1 8 0	4 20 4	2 12 8	2 7 12	4 6 2	17 5 0
Hriday Nath Mondal	0 10 0	0 10 0	0 20 0	1 8 0	4 37 0	3 2 4	1 34 12	.....	13 7 0
Sheik Keramut Ali ...	0 5 0	0 5 0	0 10 0	0 12 0	2 1 4	1 5 0	0 36 4	1 13 0	12 12 0
Sheik Muhammad Yeanas.	1 0 0	1 0 0	1 0 0	3 0 0	7 20 8	3 35 0	3 25 8	7 4 4	12 13 0
Sheik Adam Ali ...	0 10 0	0 10 0	0 20 0	1 8 0	4 25 0	2 15 0	2 10 0	4 8 0	18 0 0
Sheik Osman Khan ...	1 0 0	1 0 0	1 0 0	3 0 0	7 35 0	5 1 4	2 33 12	5 11 0	8 1 0
Kali Charan Mondal ...	0 6 0	0 6 0	0 12 0	0 14 9	2 20 8	1 20 0	1 0 8	2 0 4	10 5 0
Munshi Panchu Khan	0 10 0	0 10 0	0 20 0	1 8 0	4 35 4	3 2 4	1 33 0	3 10 4	12 14 0

Dacca.

Name of cultivator.	Area.	Quantity of seeds used.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Bochai Sarkar	1 0 0	5 0 0	41 12 0
Purna Mondal	0 10 0	2 20 0	21 10 0
Kali Kumar Sarkar ...	0 10 0	2 0 0	19 20 0
Moktal Hossain	0 15 0	3 20 0	30 7 0
Raj Mohan	1 0 0	5 0 0	35 11 0
Haladhar Mondal village Nalbari	1 0 0	5 0 0	37 0 0
Ditto village Enrajbag.	1 0 0	5 0 0	29 17 0
Bepin Mondal	0 15 0	3 20 0	21 5 0
Chandra Beapary	1 0 0	5 0 0	42 22 0
Rajani Mondal Kalaita ...	0 7 0	1 0 0	17 8 0
Ditto ...	0 10 0	2 0 0	18 23 0
Mohaprasad	0 5 0	1 0 0	8 12 0
Rai Mohan	0 5 0	1 0 0	9 20 0

Munshiganj, Dacca.

	B. K. CH.	M. S. CH.	M. S. CH.
Krishna Kumar Mondal ...	0 10 0	2 20 0	17 0 0
Monmohon Barai	0 8 0	2 0 0	13 0 0
Imamuddin Madhbar ...	0 18 0	4 0 0	35 0 0
Abdul Jabbar	0 12 0	3 0 0	16 21 0
Basanto K. Dalli	0 14 0	3 20 0	17 10 0
Golmamud Talukdar ...	0 14 0	3 20 0	20 2 0
Manik Khan	0 12 0	3 0 0	19 0 0
Madarib Khan	0 6 0	1 20 0	9 10 0
Monmohon Moral Mondul ...	0 12 0	3 0 0	18 0 0
Muhammad Jian	0 6 0	1 20 0	7 0 0
Nur Bakas Mea	0 6 0	1 20 0	10 0 0
Sekendur Haji	0 12 0	3 0 0	18 11 0
Badshai Haldar	0 8 0	2 0 0	5 0 0
Hazarat Ali	0 8 0	2 0 0	12 0 0

Narainganj, Dacca—concluded.

Name of cultivator.	Area.	Quantity of seeds used.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Gadadhar Mistri, village Pagla	0 10 0	2 0 0	20 15 8
Rai Mohon Mistri, village Jamalpur.	0 5 0	1 0 0	7 2 8
Kali Charan Barui, village Fatulla.	0 10 0	2 0 0	19 15 8
Kokaram Mondal, village Dharmaganj.	0 15 0	3 0 0	34 8 8
Prasanna Sarkar, village Buila	0 15 0	3 0 0	32 10 0
Haridas Bairagi, villagi Madganj.	0 15 0	3 0 0	33 3 12
Pandal Haldar, village Baraikhali.	0 12 8	2 20 0	20 14 0
Ram Chandra Mistri ...	0 15 0	3 0 0	33 15 0
Pandab Biswas	0 7 8	1 8 0	12 4 0
Komaruddin	0 5 0	1 0 0	8 15 0
Dinabandu Mondal ...	0 7 8	1 20 0	13 20 0
Sib Charan Sarkar	0 6 4	1 10 0	12 20 0
Panchanando Mondal ...	0 6 4	1 10 0	11 20 8
Ramnarayan Beapari, village Kayatpara.	1 0 0	4 0 0	45 10 0

Manikganj, Dacca.

	B. K. C.	M. S. CH.	M. S. CH.
Monmohon, Baira ...	0 7 0	1 2 0	13 36 0
Kalammia, Jamalpur ...	0 16 0	2 12 0	30 38 8
Kokaram Chowkidur, Baira ...	0 13 0	1 38 0	20 15 0
Sashi Pramanik, Baira ...	0 9 0	1 11 0	16 25 0
Hari Pramanik, Baira ...	0 9 0	1 13 0	17 10 6
Kokaram Karaty, Baira ...	0 15 0	2 7 0	25 27 8
Assuruddi Panchu, Baira ...	0 19 0	2 32 0	28 19 0
Panchu	0 5 0	0 30 0	8 10 8
Satish Ch. Sen, Baira ...	0 2 0	0 12 0	2 20 0
Subodh Ch. Sen, Baira ...	0 1 0	0 5 0	1 7 0
Praffulla Ch. Sen, Manikganj ...	0 2 0	0 12 0	1 15 0
Gyan Sen, Baira	0 1 0	0 5 0	0 37 0

COMPARATIVE RESULTS OF JUTE SEEDS SELECTED BY THE DEPARTMENT AGAINST THOSE ORDINARILY KEPT BY CULTIVATORS.

Dacca.

NAME OF CULTIVATOR.	Address of cultivator.	Area of land in acres.	OUTTURN.		REMARKS.
			SELECTED.	UNSELECTED.	
			M. S. CH.	M. S. CH.	
Hriday Manzi ...	Bamankitta ...	·126	3 22 0	3 1 0	The plants from selected seeds were of one kind.
Bochai Sarkar ...	Tegharia ...	·33	5 27 0	5 0 0	The plants from selected seeds were of same height.
Jayhari Mandal ...	Bansbari ...	·33	4 29 0	4 18 0	The colour of the fibre from plants of selected seeds was better and the fibre was of one quality.
Harimohan Mandal ...	Sarail ...	·126	2 20 0	2 13 0	The plants from selected seeds were of one kind and uniform height.
Madhab Mandal ...	Rathupur ...	·126	3 12 0	2 29 0	Ditto ditto.
Meghu Mandal ...	Baghia ...	·33	4 15 0	4 13 0	The plants from selected seeds were of one kind.
Panchanan Mandal ...	Sumairpara ...	·16	3 3 0	2 7 0	The plants from selected seeds were of uniform height. The colour of the fibre lovely.
Shib Charan Sarkar ...	Ditto ...	·33	6 20 0	5 34 0	The plants from selected seeds were of one kind.
Krishna K. Madbar ...	Sudarchar ...	·33	7 0 0	6 15 0	The plants from selected seeds were of one kind and of uniform height. The colour of the fibre very fine.
Ijamaddin Madhbar ...	Nayagaon ...	·33	7 25 0	7 12 8	Ditto ditto.
Monmohan Barai ...	Imamerchar ...	·33	6 5 0	5 35 8	Ditto ditto.
Sashi Mohan Barai ...	Sudharchar ...	·33	8 3 0	7 30 0	Ditto ditto.
Abdul Mia	Baraipara ...	·33	7 2 0	7 0 0	Ditto ditto.
Dongar Khan ...	Kusumpore ...	·33	8 5 0	7 25 0	Ditto ditto.
Dasarath Barai ...	Dubsha ...	·33	7 11 0	7 2 4	Ditto ditto.
Dharmenaddin Sarkar ...	Symamerchar	·33	8 0 0	7 35 0	Ditto dltto.
Rammohan Mandal ...	Hatiba ...	·33	6 1 0	5 13 0	The colour of the fibre got from plants of selected seeds was better.
Ratan Barai	Suryanaranpur	·4	8 39 0	8 12 0	The plants got from selected seeds were of uniform height. The colour of the fibre was better.
Raimohan Mistry ...	Pagla ...	·33	6 10 0	5 30 0	The plants from selected seeds were of one kind and of uniform height and thickness. The fibre was fine and the colour better.
Pandab Biswas ...	Godnail ...	·16	2 32 0	2 20 0	The plants from selected seeds were of one kind and of uniform height. The fibre was finer and the colour better.
Narayan Bepari ...	Kayatpara ...	·33	5 35 0	5 10 0	The plants from selected seeds were of one kind. The colour of the fibre was better.
Sheikh Iadin	Kusumpore ...	·33	7 11 0	6 30 0	The plants from selected seeds were of one kind and of uniform height. The colour of the fibre was very fine.
Arojali	Shealdi ...	·33	7 22 0	7 12 0	Ditto ditto.

District Mymensingh.

SUBDIVISION SADAR.

CULTIVATOR'S NAME AND ADDRESS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	B. K. CH.	B. K. CH.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Shetu Mondal ...	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	8 0 0	1 0 0	2 0 0	...
Ditto ...	0 9 0	0 9 0	0 18 0	1 5 9	3 0 0	2 25 0	0 15 0	0 12 0	...
Sheik Wahed Ali, No. I	0 15 0	0 15 0	0 30 0	2 4 0	3 20 0	2 20 0	1 0 0	2 0 0	...
Amir Sakar	0 3 0	0 3 0	0 6 0	0 7 2	0 30 0	0 20 0	0 10 0	0 8 0	1 0 0
Sheik Peru Baksha ...	0 8 0	0 8 0	0 16 0	1 3 3	4 0 0	3 20 0	0 20 0	1 0 0	...
Ditto ...	0 5 0	0 5 0	0 10 0	0 12 0	2 35 0	2 25 0	0 10 0	0 8 0	...
Ditto ...	0 13 0	0 13 0	0 26 0	1 15 3	6 0 0	5 20 0	0 20 0	1 0 0	...
Sheik Whad Ali, No. II	0 5 0	0 5 0	0 10 0	0 12 0	1 30 0	1 20 0	0 10 0	0 8 0	...
Iman Ali Sarkar ...	0 12 0	0 12 0	0 24 0	1 12 9	4 15 0	4 0 0	0 15 0	0 12 0	...
Tarani Munshi	1 0 0	1 0 0	1 0 0	3 0 0	12 0 0	12 0 0	...	...	...
Sheik Smail Munshi ...	0 15 0	0 15 0	0 30 0	2 4 0	5 15 0	4 35 0	0 20 0	1 0 0	...
Makim Raj	0 5 0	0 5 0	0 10 0	0 12 0	2 0 0	2 0 0	...	...	...
Mahiruddin Sheik ...	0 15 0	0 15 0	0 30 0	2 4 0	5 0 0	4 0 0	1 0 0	2 0 0	...
Dengu Sheik	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	5 30 12	2 9 4	4 7 5	4 6 3
Sheik Kalam Moral ...	1 12 0	1 12 0	1 24 0	4 12 9	10 0 0	8 0 0	2 0 0	4 0 0	...
Alimuddin Munshi ...	0 16 0	0 16 0	0 32 0	2 6 6	6 0 0	5 0 0	1 0 0	2 0 0	...
Sheik Shetu Mondal ...	0 16 0	0 16 0	0 32 0	2 6 6	5 0 0	4 0 0	1 0 0	2 0 0	...
Pashan Ali Sarkar ...	0 15 0	0 15 0	0 30 0	2 4 0	6 0 0	6 0 0	...	...	...
Abbas Ali Sirkar ...	0 14 0	0 14 0	0 28 0	2 1 9	4 0 0	3 5 6	0 34 10	1 11 8	...
Azil Sardar	0 15 0	0 15 0	0 30 0	2 4 0	4 0 0	3 30 0	0 10 0	0 8 0	...
Sheik Mamin	0 9 0	0 9 0	0 18 0	1 5 9	3 0 0	2 25 0	0 15 0	0 12 0	...
Sheik Jamir No. (I) ...	0 9 0	0 9 0	0 18 0	1 5 9	3 0 0	2 30 0	0 10 0	0 8 0	...
Sheik Jamir No. (II) ...	0 12 0	0 12 0	0 24 0	1 12 9	4 0 0	4 0 0	...	...	...

Kannamondal, Mymensingh.

	B. K. CH.	B. K. CH.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Arjun Sirkar	0 16 0	0 16 0	0 32 0	2 6 5	7 35 0	6 16 0	1 19 0	2 15 3	2 2 3
Sheik Ali Muhammad	0 12 0	0 12 0	0 24 0	1 12 9	4 35 0	4 32 0	0 3 0	0 2 6	.....
Sheik Sabed Ali Fakir	0 8 0	0 8 0	0 16 0	1 3 3	3 20 0	2 20 0	1 0 0	2 0 0	6 0 0
Sheik Tangi	0 10 0	0 10 0	0 20 0	1 8 0	4 15 0	3 22 8	0 32 8	1 10 0	0 12 0
Jogendra Nama Das ...	0 5 0	0 5 0	0 10 0	0 12 0	2 20 0	2 5 0	0 15 0	0 12 0	.....
Sheik Sabed Ali ...	1 0 0	1 0 0	1 0 0	3 0 0	8 35 0	7 24 0	1 11 0	2 9 0	.....
Brindaban Nama Das...	1 0 0	1 0 0	1 0 0	3 0 0	9 10 0	8 15 0	0 35 0	1 12 0	.....
Sheik Denguri Bakshi	1 0 0	1 0 0	1 0 0	3 0 0	10 0 0	7 20 0	2 20 0	5 0 0	6 0 0
Sheik Wazuddin ...	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	8 10 0	0 30 0	1 8 0	.....
Sheik Saduir	1 0 0	1 0 0	1 0 0	3 0 0	8 25 0	8 20 0	0 5 0	0 4 0	Loss.
Sheik Matoo	0 12 0	0 12 0	0 24 0	1 12 9	7 10 0	5 7 0	2 3 0	4 2 6	11 10 0
Pancha Tilak Das ...	0 12 0	0 12 0	0 24 0	1 12 9	4 15 0	2 34 0	1 21 0	3 0 9	6 4 0
Sheik Osman	0 10 0	0 10 0	0 20 0	1 8 0	6 10 0	4 0 0	2 10 0	4 8 0	18 0 0
Sabjali Sarkar	0 10 0	0 10 0	0 20 0	1 8 0	4 20 0	3 0 0	1 20 0	3 0 0	9 0 0
Sheik Abbas Ali ...	0 10 0	0 10 0	0 20 0	1 8 0	4 0 0	3 9 2	0 30 14	1 8 7	0 3 6

Ghoga, Mymensingh.

	B. K. CH.	B. K. CH.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Kedar Nath Chakrabarti.	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	7 0 0	2 0 0	4 0 0	3 0 0
Ram Krishna Mali ...	1 0 0	1 0 0	1 0 0	3 0 0	5 0 0	4 20 0	0 20 0	1 0 0	Loss.
Mayadhan Ali Mondal	1 0 0	1 0 0	1 0 0	3 0 0	6 25 0	5 5 0	1 20 0	3 0 0	Do.
Rafaman Fakir ...	1 0 0	1 0 0	1 0 0	3 0 0	8 26 0	6 15 0	2 11 0	4 8 9	4 10 3
Tani Hazi	1 0 0	1 0 0	1 0 0	3 0 0	7 23 0	5 30 0	1 33 0	3 10 6	1 15 6
Azitulla Sheik	1 0 0	1 0 0	1 0 0	3 0 0	7 24 0	6 22 0	1 2 0	2 1 6	Loss.
Bagirath Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	6 35 0	5 30 0	1 5 0	2 4 0	Do.
Aradhan Mandal ...	1 0 0	1 0 0	1 0 0	3 0 0	9 26 0	7 35 0	1 31 0	3 8 9	1 10 3
Abdul Mandal	1 0 0	1 0 0	1 0 0	3 0 0	6 20 0	5 14 0	1 6 0	2 4 9	Loss.
Benod Sheik	1 0 0	1 0 0	1 0 0	3 0 0	8 20 0	6 35 0	1 25 0	3 4 0	0 12 0
Ismat Sheik	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 35 0	1 5 0	2 4 0	Loss.
Afaz Khan	1 0 0	1 0 0	1 0 0	3 0 0	4 25 0	3 30 0	0 35 0	1 12 0	Do.
Nabizan	1 0 0	1 0 0	1 0 0	3 0 0	5 15 0	4 23 0	0 32 0	1 9 6	Do.

WINTER PADDY WITH BONEMEAL—*continued.*

Ghoga, Mymensingh—concluded.

CULTIVATOR'S NAME AND ADDRESS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre after deducting the price of bonemeal.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	B. K. CH.	B. K. CH.	M. S. CH.	RS. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	RS. A. P.	RS. A. P.
Osman A. Khan... ...	1 0 0	1 0 0	1 0 0	3 0 0	6 31 0	5 17 0	1 14 0	2 11 3	Loss.
Iswar Ch. De	1 0 0	1 0 0	1 0 0	3 0 0	9 25 0	6 35 0	2 30 0	5 8 0	7 8 0
Sadar Mondal	1 0 0	1 0 0	1 0 0	3 0 0	8 20 0	7 15 0	1 5 0	2 4 0	Loss.
Tarif Sheik	1 0 0	1 0 0	1 0 0	3 0 0	5 15 0	4 30 0	0 25 0	1 4 0	Do.
Imanad Ali	1 0 0	1 0 0	1 0 0	3 0 0	6 13 0	5 4 0	1 9 0	2 7 3	Do.
Abdul Mandal	1 0 0	1 0 0	1 0 0	3 0 0	7 18 0	6 14 0	1 4 0	2 3 3	Do.
Mamud Jan	1 0 0	1 0 0	1 0 0	3 0 0	3 30 0	3 30 0	.....	.....	Do.
Mamud Sarcar	1 0 0	1 0 0	1 0 0	3 0 0	6 18 0	5 12 0	1 6 0	2 4 9	Do.
Asram Mondal ...	1 0 0	1 0 0	1 0 0	3 0 0	7 19 0	5 19 0	2 0 0	4 0 0	3 0 0
Ibrahim Mondal ...	1 0 0	1 0 0	1 0 0	3 0 0	6 33 0	5 5 0	1 30 0	3 8 0	1 8 0
Ali Sarcar	1 0 0	1 0 0	1 0 0	3 0 0	4 25 0	4 15 0	0 10 0	0 8 0	Loss.

Jorabari, Mymensingh.

Kapitulla Tarafdar ...	0 10 0	0 10 0	0 20 0	1 8 0	4 3 0	3 10 0	0 33 0	1 10 5	0 14 6
Alep Khan	0 16 0	0 16 0	0 32 0	2 6 6	6 27 0	4 18 0	2 9 0	4 7 3	7 10 10
Azim Khan	0 19 0	0 19 0	0 38 0	2 13 6	6 9 0	4 22 0	1 27 0	3 5 6	1 9 3
Ashan Mondal ...	0 7 0	0 7 0	0 14 0	1 0 9	3 30 0	3 1 0	1 29 0	3 7 3	21 0 0
Muhammad Ali Sarcar	1 1 0	1 1 0	1 2 0	3 2 6	6 2 0	5 26 0	0 16 0	0 12 9	Loss.
Poka Sheik	1 5 0	1 5 0	1 10 0	3 12 0	7 1 0	6 9 0	0 32 0	1 9 6	Do.
Azal Sheik	0 15 0	0 15 0	0 30 0	2 4 0	5 12 0	5 3 0	0 9 0	0 7 3	Do.
Samsher Khan	0 17 0	0 17 0	0 34 0	2 8 9	6 3 0	4 11 0	2 32 0	5 9 6	10 12 3
Amin Mondal ...	0 9 0	0 9 0	0 18 0	1 2 9	2 20 0	2 1 0	0 19 0	0 15 3	Loss.
Tarif Hazi	0 19 0	0 19 0	0 38 0	2 13 6	6 11 0	5 18 0	0 33 0	1 10 6	Do.
Jarif Khan	0 10 0	0 10 0	0 20 0	1 8 0	4 1 0	3 3 0	0 38 0	1 14 6	2 7 0
Sharip Sheik	0 15 0	0 15 0	0 30 0	2 4 0	6 17 0	5 12 0	1 5 0	2 4 0	Loss.
Adal Sheik	0 19 0	0 19 0	0 38 0	2 13 6	7 6 0	5 9 0	0 37 0	1 13 6	Do.
Ismail Khan	0 13 0	0 13 0	0 26 0	1 15 3	5 5 0	3 23 0	1 22 0	3 1 6	5 4 2
Shukur Muhammad Sheik.	0 10 0	0 10 0	0 20 0	1 8 0	4 3 0	3 10 0	0 33 0	1 10 4	0 15 0
Tazu Mondal	1 0 0	1 0 0	1 0 0	3 0 0	7 22 0	5 09 0	2 3 0	4 2 6	3 7 6
Ainaddi Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	5 13 0	4 18 0	0 35 0	1 12 0	Loss.
Abbas Sarkar ...	1 3 0	1 3 0	1 6 0	3 7 3	9 1 0	7 9 0	1 32 0	3 9 6	0 6 0
Kalim Khan	0 17 0	0 17 0	0 34 0	2 8 9	7 11 0	4 22 0	2 29 0	5 7 3	10 3 10
Kailash Chandra Sarkar	1 1 0	1 1 0	1 2 0	3 3 0	9 3 0	8 32 0	0 11 0	0 8 9	Loss.
Joymandal	1 0 0	1 0 0	1 0 0	3 0 0	6 18 0	5 2 0	1 16 0	2 12 9	Do.
Isrinishi Sheikh ...	1 18 0	0 18 0	0 36 0	2 11 3	7 24 0	5 31 0	1 33 0	3 10 4	3 2 6
Gadu Mondal ...	1 3 0	1 3 0	1 6 0	3 7 3	8 19 0	7 15 0	1 4 0	2 3 3	Loss.
Khanu Mondal ...	0 16 0	0 16 0	0 32 0	2 6 6	8 6 0	6 9 0	1 37 0	3 13 6	5 6 3
Ashan Moral ...	0 16 0	0 16 0	0 32 0	2 6 6	7 9 0	5 18 0	1 31 0	3 8 9	4 4 7
Hushi Sheikh ...	1 0 0	1 0 0	1 0 0	3 0 0	7 19 0	8 3 0	.....	.....	...
Alimaddin Mondal ...	0 13 0	0 13 0	0 26 0	1 15 3	3 27 0	1 2 0	2 25 0	5 4 0	15 3 9
Jabali Sheikh	0 19 0	0 19 0	0 38 0	2 13 6	5 11 0	3 18 0	1 33 0	3 10 6	2 10 3
Asharap Mondal ...	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 7 0	1 33 0	3 10 6	1 15 6
Asan Mondal	0 14 0	0 14 0	0 28 9	2 1 9	4 2 0	2 28 0	1 14 0	2 11 3	2 13 0
Shanu Mondal ...	0 12 0	0 12 0	0 24 0	1 12 9	3 13 0	1 32 0	1 21 0	3 0 9	6 4 0
Ahamed Khan ...	1 0 0	1 0 0	1 0 0	3 0 0	9 17 0	5 38 0	3 19 0	6 15 3	11 13 9
Izad Khan	0 13 0	0 13 0	0 26 0	1 15 3	4 18 0	1 22 0	2 36 0	5 13 0	17 13 0
Shadal Khan	0 19 0	0 19 0	0 38 0	2 13 6	8 14 0	6 25 0	1 29 0	3 7 3	2 1 0
Jahar Sheikh	0 10 0	0 10 0	0 20 0	1 8 0	4 9 0	2 28 0	1 21 0	3 0 9	19 5 6
Naimaddi Mondal ...	0 10 0	0 10 0	0 20 0	1 8 0	4 11 0	2 9 0	2 2 0	4 1 6	15 9 0

WINTER PADDY WITH BONEMEAL—*continued.*

Muktagacha, Mymensingh.

NAME AND ADDRESS OF CULTIVATORS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre after deducting the price of bonemeal.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	A. R. P.	A. R. P.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A P.
Seyed Ali Sarcar ...	0 17 0	0 17 0	0 34 0	2 8 9	4 20 0	3 26 0	0 34 0	1 11 6	Loss.
Alemuddin Sarcar ...	0 18 0	0 18 0	0 36 0	2 11 3	5 5 0	4 30 0	0 15 0	0 12 0	Do.
Taramani Debya ...	1 0 0	1 0 0	1 0 0	3 0 0	3 20 0	3 10 0	0 10 0	0 8 0	Do.
Laljan Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	5 10 0	3 20 0	1 30 0	3 8 0	1 8 0
Ditto	0 18 0	0 18 0	0 36 0	2 11 3	8 0 0	6 32 4	1 7 12	2 6 3	Loss.
Mana Sheikh	2 0 0	2 0 0	2 0 0	6 0 0	5 5 0	5 10 0	0 5 0	0 4 0	Do.
Ditto	0 15 0	0 15 0	0 30 0	2 4 0	8 15 0	6 25 0	1 30 0	3 8 0	5 0 0
Mocha Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	4 20 0	3 20 0	1 0 0	2 0 0	Loss.
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	6 25 0	5 9 0	0 16 0	0 12 9	Do.
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	7 10 0	5 35 0	1 15 0	2 12 0	Do.
Abu Chany	1 0 0	1 0 0	1 0 0	3 0 0	5 20 0	5 5 0	0 15 0	0 12 0	Do.
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	3 15 0	3 10 0	0 5 0	0 4 0	Do.
Salim Peada	1 0 0	1 0 0	1 0 0	3 0 0	6 25 0	5 12 0	1 13 0	2 10 3	Do.
Karim Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	5 4 0	5 4 0	...	...	.....
Jagat Chandra Gope ...	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 15 0	1 25 0	3 4 0	0 12 0
Ditto ...	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 0 0	2 0 0	4 0 0	3 0 0
Rajani Kanta De ...	1 0 0	1 0 0	1 0 0	3 0 0	4 15 0	4 15 0	...	...	.....
Abdul Sheikh	0 16 0	0 16 0	0 32 0	2 6 9	5 15 0	4 32 0	0 23 0	1 2 6	Loss.
Jadu Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	5 30 0	2 10 0	4 8 0	4 8 0
Laju Sheikh	0 18 0	0 18 0	0 36 0	2 11 3	7 0 0	6 10 0	0 30 0	1 8 0	Loss.
Chabarali Sheikh ...	1 0 0	1 0 0	1 0 0	3 0 0	4 20 0	4 20 0	...	...	.....
Abdul Sarcar	0 18 0	0 18 0	0 36 0	2 11 3	3 14 0	3 3 12	0 10 4	0 8 2	Loss.
Dina Khalipa	0 19 0	0 19 0	0 38 0	2 13 9	5 20 0	4 12 0	1 8 0	2 6 3	Do.
Madhu Ch. Chaudhuri	1 0 0	1 0 0	1 0 0	3 0 0	7 20 0	6 20 0	1 0 0	2 0 0	Do.

Dholla, Mymensingh.

Harmat Ali	0 10 0	0 10 0	0 20 0	1 8 0	5 10 0	4 0 0	1 10 0	2 8 0	6 0 0
Akmash Ali Fakir ...	0 5 0	0 5 0	0 10 0	0 12 0	3 0 0	2 8 0	0 32 0	1 10 0	10 8
Dulia Sheik	1 4 0	1 4 0	1 8 0	3 10 0	12 25 0	10 0 0	2 25 0	5 4 0	4 1 0
Ditto	1 7 0	1 7 0	1 14 0	4 0 9	13 0 0	9 0 0	4 0 0	8 0 0	8 12 7
Ram-Narayan-Nur ...	0 8 0	0 8 0	0 16 0	1 3 3	4 15 0	4 0 0	0 15 0	0 12 0	.....
Ditto ...	0 12 8	0 12 8	0 25 0	1 14 0	6 30 0	4 0 0	2 30 0	5 8 0	17 6 3
Churaman Mazi	0 15 0	0 15 0	0 30 0	2 4 0	8 0 0	6 15 0	1 25 0	3 4 0	4 0 0
Chura Sheik	0 15 0	0 15 0	0 30 0	2 4 0	7 0 0	5 25 0	1 15 0	2 12 0	2 0 0
Kamala Kanta De ...	0 7 8	0 7 8	0 15 0	1 2 0	5 0 0	3 20 0	1 20 0	3 0 0	15 0 0
Abdul Sheik	0 7 8	0 7 8	0 15 0	1 2 0	4 30 0	3 0 0	1 30 0	3 8 0	19 0 0
Rahim Mandal	2 10 0	2 10 0	2 20 0	7 8 0	30 0 0	23 0 0	7 0 0	14 0 0	7 9 7
Ditto	0 15 0	0 15 0	0 30 0	2 4 0	9 0 0	7 5 0	1 35 0	3 12 0	6 0 0
Ramgopal Mala	0 7 8	0 7 8	0 15 0	1 2 0	4 0 0	3 0 0	1 0 0	2 0 0	7 0 0

Baliadi Kalirbazar, Mymensingh.

Fulchan Paramanik ...	0 6 0	0 6 0	0 12 0	0 14 6	2 20 0	1 30 0	0 30 0	1 8 0	6 0 0
Ram Sundar Paramanik	0 4 0	0 4 0	0 8 0	0 9 6	1 5 0	1 13 5	.....	.....	...
Ram Giri	0 6 0	0 6 0	0 12 0	0 14 6	2 0 0	1 23 13	0 16 3	0 13 0	.....
Sitaram Mandal ...	0 6 0	0 6 0	0 12 0	0 14 6	3 0 0	2 0 0	1 0 0	2 0 0	11 0 0
Taribulla Sheik ...	0 8 0	0 8 0	0 16 0	1 3 3	5 0 0	3 0 0	2 0 0	4 0 0	21 0 0
Matiram Zamadar ...	0 18 0	0 18 0	0 36 0	2 11 3	9 0 0	7 8 0	1 32 0	3 10 0	3 1 2
Kitabdi	0 4 0	0 4 0	0 8 0	0 9 6	3 0 0	1 35 0	1 5 0	2 4 0	24 13 6
Abir Pedu	0 10 0	0 10 0	0 20 0	1 8 0	4 0 0	3 30 0	0 10 0	0 8 0	.....

WINTER PADDY WITH BONEMEAL—*continued.*

Raj Cutcherry, Mohonpur, Mymensingh.

CULTIVATOR'S NAME AND ADDRESS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre after deducting the price of bonemeal.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	B. K. CH	B. K. H.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Taher Muhammad Sarcar.	2 0 0	2 0 0	2 0 0	6 0 0	12 0 0	9 28 0	2 12 0	4 9 6	.....
Taher Mandal ...	1 0 0	1 0 0	1 0 0	3 0 0	4 0 0	3 25 0	0 15 0	0 12 0	.....
Moyez Akanda ...	1 15 0	1 15 0	1 30 0	5 4 0	9 0 0	7 22 12	1 17 4	2 14 0	.....
Kalim Mandal ...	1 10 0	1 10 0	1 20 0	4 8 0	5 20 0	4 15 10	1 4 6	2 4 0	.....

Tangail, Mymensingh.

Ram Ch. De ...	1 15 0	1 15 0	1 30 0	5 4 0	12 0 0	10 0 0	2 0 0	4 0 0	.....
Ditto ...	1 15 0	1 15 0	1 30 0	5 4 0	10 0 0	10 0 0	.....	.....	.....
Sheik Tanoo	1 10 0	1 10 0	1 20 0	4 8 0	10 0 0	8 20 0	1 20 0	3 0 0	.....
Sheik Manu	1 3 0	1 3 0	1 6 0	3 7 3	6 0 0	5 0 0	1 0 0	2 0 0	.....

Gunzium, Mymensingh.

Azit Tarafdar ...	1 3 0	1 3 0	1 6 0	3 3 7	5 20 0	5 0 0	0 20 0	1 0 0	.....
Raham Ali Sheik ...	0 9 8	0 9 8	0 19 0	1 6 9	1 8 0	1 8 0	.....	.....	.....
Ali Mandal	0 8 8	0 8 8	0 17 0	1 4 6	2 30 0	2 0 0	0 30 0	1 8 0	1 9 6
Panchu Sheik ...	0 9 8	0 9 8	0 19 0	1 6 9	2 0 0	1 0 0	1 0 0	2 0 0	3 10 0
Ram Tanu Mazi ...	1 0 0	1 0 0	1 0 0	3 0 0	3 0 0	3 0 0	.....	.....	.....
Fazar Shaik	0 7 8	0 7 8	0 15 0	1 2 0	3 30 0	3 20 0	0 10 0	0 8 0	.....
Anan Ali Sarkar ...	0 8 0	0 8 0	0 16 0	1 3 3	2 30 0	2 10 0	0 10 0	0 8 0	.....
Habil Akhand ...	0 5 8	0 5 8	0 11 0	0 13 3	1 10 0	1 10 0	.....	.....	.....
Azim Akhand ...	0 9 0	.....	0 18 0	1 5 9	2 20 0	.....	.....	.....	.....
Abwzan Akhand ...	0 11 0	.....	0 22 0	1 10 3	2 5 0	.....	.....	.....	.....
Hemed Akhand ...	0 10 0	0 10 0	0 20 0	1 8 0	2 10 0	2 10 0	.....	.....	.....
Mazit Akhand ...	0 10 0	0 10 0	0 20 0	1 8 0	2 0 0	2 0 0	.....	.....	.....
Abdul Munshi ...	1 0 0	1 0 0	1 0 0	3 0 0	5 20 0	5 20 0	.....	.....	.....
Girish Chandra Das ...	0 8 0	0 8 0	0 16 0	1 3 3	2 20 0	2 20 0	.....	.....	.....
Radha Mohan Das ...	0 8 0	0 8 0	0 16 0	1 3 3	2 10 0	2 10 0	.....	.....	.....
Ram Dayal Das ...	0 8 0	0 8 0	0 16 0	1 3 3	3 0 0	2 30 0	0 10 0	0 8 0	.....
Dali Moral	1 3 0	1 3 0	1 6 0	3 7 3	6 30 0	6 30 0	.....	.....	.....
Abir Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	9 30 0	7 20 0	2 10 0	4 8 0	4 8 0
Mohesh Chandra Das	0 8 0	0 8 0	0 16 0	1 3 3	2 0 0	1 20 0	0 20 0	1 0 0	.....
Rama Chang	0 7 8	0 7 8	0 15 0	1 2 0	5 10 0	5 10 0	.....	.....	.....
Dulal Karmakar ...	0 11 0	.....	0 22 0	1 10 3	3 20 0	.....	.....	.....	.....
Jam Khan	1 0 0	1 0 0	1 0 0	3 0 0	3 10 0	3 10 0	.....	.....	.....
Ozwir Koch ...	0 14 0	.....	0 28 0	2 1 9	2 35 0	.....	.....	.....	.....
Ray Chandra Das ...	1 0 0	.....	1 0 0	3 0 0	3 30 0	.....	.....	.....	.....
Ram Dayal Sarkar ...	0 8 0	0 8 0	0 16 0	1 3 3	2 0 0	1 35 0	0 5 0	0 14 0	.....

WINTER PADDY WITH BONEMEAL—*continued.*

Gunzium, Mymensingh—concluded.

NAME AND ADDRESS OF CULTIVATORS.	AREA.		MANURED.		OUTTURN.		DIFFERENCE.		Profit per acre after deducting the price of bonemeal.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	A. R. P.	A. R. P.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Habia Sheikh	0 15 8	.....	0 31 0	2 5 3	3 35 0	.....	.....	.....	.....
Sahayan Sheikh ...	0 13 8	0 13 8	0 27 0	2 0 3	2 5 0	2 5 0	.....	.....	.....
Kudrat Shipahi ...	0 16 0	.....	0 32 0	2 6 6	2 20 0	.....	.....	.....	.....
Eyasin Sheikh ...	0 8 0	0 8 0	0 16 0	1 3 3	1 10 0	1 10 0	.....	.....	.....
Jahar Fakir ...	0 8 0	0 8 0	0 16 0	1 3 3	2 20 0	2 20 0	.....	.....	.....
Enamandal	1 0 0	1 0 0	1 0 0	3 0 0	4 35 0	4 35 0	.....	.....	.....
Sarabadi Fakir ...	0 8 0	0 8 0	0 16 0	1 3 3	1 15 0	1 15 0	.....	.....	.....
Madan Mohan Banik ...	0 10 0	.....	0 20 0	1 8 0	2 30 0	.....	.....	.....	.....
Sanaulla Mandal ...	0 18 0	0 18 0	0 36 0	2 11 3	4 20 0	4 20 0	.....	.....	.....
Jamir Munshi ...	1 0 0	.....	1 0 0	3 0 0	9 10 0	.....	.....	.....	.....
Salim Sarkar ...	1 0 0	.....	1 0 0	3 0 0	4 5 0	.....	.....	.....	.....
Rama Kanta Das ...	0 9 0	0 9 0	0 18 0	1 5 9	2 20 0	2 0 0	0 20 0	1 0 0	.....
Amrita Mazi	1 0 0	.....	1 0 0	3 0 0	3 0 0	.....	.....	.....	.....

Ramgopalpur, Mymensingh.

Chandra Nath Das ...	1 0 0	1 0 0	1 0 0	3 0 0	4 0 0	3 10 0	0 30 0	1 8 0	.....
Mohesh Chandra Chaudhuri.	1 0 0	1 0 0	1 0 0	3 0 0	5 20 0	5 0 0	0 20 0	1 0 0	.....
Bipin Chandra Das ...	1 4 0	1 4 0	1 8 0	3 10 0	3 10 0	3 0 0	0 10 0	0 8 0	.....
Dwijendra Chandra De	0 8 0	0 8 0	0 16 0	1 3 3	1 10 0	1 0 0	0 10 0	0 8 0	.....
Satish Chandra Dutt ...	0 18 0	0 18 0	0 36 0	2 11 6	3 15 0	3 0 0	0 15 0	0 12 0	.....
Sheikh Chamed Ali ...	0 6 0	0 6 0	0 12 0	0 14 6	1 0 0	0 30 0	0 10 0	0 8 0	.....
Khetu Sheikh ...	0 17 0	0 17 0	0 34 0	2 9 0	2 25 0	2 10 0	0 15 0	0 12 0	.....
Chandra Nath Das ...	1 12 0	1 12 0	1 24 0	4 12 9	4 20 0	4 0 0	0 20 0	1 0 0	.....
Jaraj	0 14 0	0 14 0	0 28 0	2 1 9	5 0 0	3 20 0	1 20 0	3 0 0	3 13 9
Brahamani Nath ...	0 3 0	0 3 0	0 6 0	0 7 6	1 0 0	0 30 0	0 10 0	0 8 0	.....
Sheikh Samed Ali ...	0 12 0	0 12 0	0 24 0	1 12 9	3 15 0	3 0 0	0 15 0	0 12 0	.....
Ditto ...	0 12 0	0 12 0	0 24 0	1 12 9	3 25 0	3 5 0	0 20 0	1 0 0	.....

Bailar, Mymensingh.

Chabed Sheikh ...	0 9 0	0 9 0	0 18 0	1 5 9	4 0 0	3 30 0	0 10 0	0 8 0	.....
Ditto ...	0 5 8	0 5 8	0 11 0	0 13 6	2 25 0	2 8 0	0 17 0	0 13 6	.....
Ditto ...	0 17 8	0 17 8	0 35 0	2 10 0	8 0 0	7 6 4	0 33 12	1 11 0	.....
Chabi Sheikh ...	0 16 0	0 16 0	0 32 0	2 6 3	7 0 0	5 34 8	1 5 8	2 4 3	.....
Ditto ...	0 8 0	0 8 0	0 16 0	1 3 3	4 0 0	3 20 0	0 20 0	1 0 0	.....
Ditto ...	0 14 0	0 14 0	0 28 0	2 1 9	6 5 0	4 33 0	1 12 0	2 10 0	2 3 4
Kaocha Pal ...	0 15 0	0 15 0	0 30 0	2 4 0	6 20 0	5 30 0	0 30 0	1 8 0	.....
Inchan Munshi ...	0 10 0	0 10 0	0 20 0	1 8 0	5 30 0	4 0 0	1 30 0	3 8 0	12 0 0
Ditto ...	0 10 0	0 10 0	0 20 0	1 8 0	2 5 0	3 0 0	.....	.....	.....
Ditto ...	0 12 8	0 12 8	0 25 0	1 14 0	3 10 0	3 30 0	0 20 0	1 0 0	.....
Hanifa Bepari ...	0 10 0	0 10 0	0 20 0	1 8 0	5 0 0	4 0 0	1 0 0	2 0 0	3 0 0
Ditto ...	0 7 8	0 7 8	0 15 0	1 2 0	2 0 0	2 16 0	.....	.....	.....
Hanifa Bepari	0 18 0	0 18 0	0 36 0	2 11 3	6 35 0	6 0 0	0 35 0	1 12 0	.....
Izad Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	7 5 0	5 0 0	2 5 0	4 4 0	3 12 0
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 0 0	2 0 0	4 0 0	3 0 0
Kaimulla Sarkar ...	0 15 0	0 15 0	0 30 0	2 4 0	6 30 0	5 0 0	1 30 0	3 8 0	5 0 0
Aniulla Sarkar	2 0 0	2 0 0	2 0 0	6 0 0	17 0 0	14 0 0	3 0 0	6 0 0	.....
Khoru Chowkidar ...	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	5 0 0	4 0 0	8 0 0	15 0 0
Mamud Ali Tarafdar ...	1 0 0	1 0 0	1 0 0	3 0 0	6 0 0	7 0 0	.....	.....	.....
Ditto ...	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	6 0 0	1 0 0	2 0 0	.....

WINTER PADDY WITH BONEMEAL—*continued.*

Jamalpore (Mymensingh).

NAME AND ADDRESS OF CULTIVATORS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	B. K. CH.	B. K. CH.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Meazan Sheikh	2 5 0	2 5 0	2 10 0	6 12 0	24 0 0	20 0 0	4 0 0	8 0 0	1 10 8
Akbar Munshi	2 15 0	2 15 0	2 30 0	8 4 0	28 0 0	24 30 0	3 10 0	6 8 0	.....
Rajab Ali	2 0 0	2 0 0	2 0 0	6 0 0	26 0 0	20 0 0	6 0 0	12 0 0	9 0 0
Mamud Ali Sheikh ...	2 0 0	2 0 0	2 0 0	6 0 0	16 0 0	9 0 0	7 0 0	14 0 0	13 0 0
Maulavi Ismail... ...	3 0 0	3 0 0	3 0 0	9 0 0	30 0 0	24 20 0	5 20 0	11 0 0	2 0 0
Shona Munshi Sheikh	0 9 0	0 9 0	0 18 0	1 5 9	5 0 0	3 0 0	2 0 0	4 0 0	17 10 9
Gomadua	1 0 0	1 0 0	1 0 0	3 0 0	12 20 0	8 0 0	4 20 0	9 0 0	18 0 0
Shamsher Ali	0 10 0	0 10 0	0 20 0	1 8 0	6 0 0	4 20 0	1 20 0	3 0 0	9 0 0
Shagar Sheikh	0 10 0	0 10 0	0 20 0	1 8 0	6 0 0	4 0 0	2 0 0	4 0 0	15 0 0
Mabu Sheikh	0 10 0	0 10 0	0 20 0	1 8 0	6 20 0	5 0 0	1 20 0	3 0 0	9 0 0
Abbas Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	16 0 0	11 0 0	2 0 0	4 0 0	3 0 0

Jorebari Raj Kutchari (Mymensingh).

Tazumandal	1 0 0	1 0 0	1 0 0	3 0 0	7 22 0	5 19 0	2 3 0	4 2 3	3 6 9
Azinaddin Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	5 13 0	4 18 0	0 55 0	1 12 0	.....
Abbas Sarkar ...	1 3 0	1 3 0	1 6 0	3 7 6	9 1 0	7 9 0	1 32 0	3 10 0	0 7 3
Kali n Khan	0 17 0	0 17 0	0 34 0	2 8 9	7 11 0	4 22 0	2 29 0	5 7 3	10 3 1
Kailash Ch. Sarkar ...	1 1 0	1 1 0	1 2 0	3 1 3	9 3 0	8 32 0	0 11 0	0 9 0	.....
Joymandal	1 0 0	1 0 0	1 0 0	3 0 0	6 18 0	5 2 0	1 16 0	2 13 0	.....
Ishinishi Sheikh ...	0 18 0	0 18 0	0 36 0	2 11 3	7 28 0	5 31 0	1 37 0	3 13 3	3 12 0
Gadu Mandal	1 3 0	1 3 0	1 6 0	3 7 6	8 19 0	7 15 0	1 4 0	2 3 0	...
Kanu Mandal	0 16 0	0 16 0	0 32 0	2 6 6	8 6 0	6 9 0	1 37 0	3 13 3	5 5 4
Ashan Moral	0 16 0	0 16 0	0 32 0	2 6 6	7 9 0	5 18 0	1 31 0	3 8 9	4 7 5
nushi Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	7 19 0	8 3 0	.....	.....	.....
Alimuddin Mandal ...	0 13 0	0 13 0	0 26 0	1 15 3	3 27 0	1 2 0	2 25 0	5 4 0	15 3 6
Jahhar Ali Sheikh ...	0 19 0	0 19 0	0 38 0	2 13 6	5 11 0	3 18 0	1 33 0	3 10 4	2 6 0
Ashrab Mandal ...	1 0 0	0 1 0	1 0 0	3 0 0	7 0 0	5 7 0	1 33 0	3 10 6	1 15 6
Ashan Mandal	0 14 0	0 14 0	0 28 0	2 1 9	4 2 0	2 28 0	1 14 0	2 11 3	2 8 3
Sham Mandal	0 12 0	0 12 0	0 24 0	1 12 9	3 13 0	1 32 0	1 21 0	3 0 9	6 4 0
Ahamed Khan	1 0 0	1 0 0	1 0 0	3 0 0	9 17 0	5 38 0	3 19 0	6 15 3	11 13 9
Ijjat Khan	0 13 0	0 13 0	0 26 0	1 15 3	4 18 0	1 22 0	2 36 0	5 12 9	14 4 10
Sadak Khan	0 19 0	0 19 0	0 38 0	2 13 9	8 14 0	6 25 0	1 29 0	3 7 3	11 14 6
Jahar Sheikh	0 10 0	0 10 0	0 20 0	1 8 0	4 9 0	2 28 0	1 21 0	3 0 9	9 4 6
Naimuddin Mandal ...	0 10 0	0 10 0	0 20 0	1 8 0	4 11 0	2 9 0	2 2 0	4 1 6	15 9 0

Dhitpur Raj Cutcherry, Mymensingh.

Sheikh Sabad Ali ...	0 6 12	0 6 12	0 13 8	1 0 3	2 16 0	1 32 0	0 24 0	1 3 3	1 10 8
Samiruddin Sarkar ...	0 7 8	0 7 8	0 15 0	1 2 0	3 36 0	3 5 0	0 31 0	1 8 9	3 6 0
Ramanath Karmaker ...	0 15 0	0 15 0	0 30 0	2 4 0	7 0 0	5 0 0	2 0 0	4 0 0	7 0 0
Sheikh Kudrat Ali ...	0 12 8	0 12 8	0 25 0	1 14 0	6 0 0	5 11 8	0 28 8	1 6 9	.....
Lochan Karma ar ...	0 14 8	0 14 8	0 29 0	2 2 9	6 28 0	5 0 0	1 28 0	3 6 3	5 0 6
Samiruddin Sarkar ...	0 16 0	0 16 0	0 32 0	2 6 3	9 0 0	7 28 0	.....	.....	.....
Rohini Karmakar ...	0 15 8	0 15 8	0 31 0	2 5 3	7 25 0	7 30 0	.....	.....	.....
Tara Kanta Chakravarti.	0 12 0	0 12 0	0 24 0	1 12 6	8 0 8	25 10 0	.....	.....	.....
Jeharuddin Sarkar ...	0 15 8	0 15 8	0 31 0	2 5 3	8 0 0	6 2 13	.....	.....	.....
Jagannath Pal	1 7 0	1 7 0	1 14 0	4 0 9	13 30 0	11 28 0	.....	.....	.....
Samiruddin Sarkar ...	0 12 0	0 12 0	0 24 0	1 12 6	6 22 0	4 28 11	1 33 5	8 10 8	5 6 10
Raj Mohan Das ...	1 10 0	1 10 0	1 20 0	4 8 0	12 34 0	8 38 6	3 35 10	7 12 6	6 9 0

WINTER PADDY WITH BONEMEAL—*continued.*

Gaffargaon, Mymensingh.

CULTIVATOR'S NAME AND ADDRESS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	A. R. P.	A. R. P.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Sheikh Jamshat Ali ...	1 4 0	1 4 0	1 8 0	3 10 0	13 6 0	9 18 0	3 28 0	7 6 4	9 6 10
Jangh Bahadur ...	0 15 0	0 15 0	0 30 0	2 4 0	10 0 0	6 12 0	3 28 0	7 6 4	20 5 4
Krishna Ch. De ...	0 14 0	0 14 0	0 28 0	2 2 0	10 16 0	6 15 0	4 1 0	8 9	25 6 1
Inchan Go'am Das ...	1 4 0	1 4 0	1 8 0	3 10 0	15 7 0	10 11 0	4 36 0	9 12 10	15 7 6
Abdu Rahaman Sarkar	0 10 0	0 10 0	0 20 0	1 8 0	5 37 0	3 32 0	2 5 0	4 4 0	16 8 0
Ditto ...	1 0 0	1 0 0	1 0 0	3 0 0	12 21 0	8 0 0	4 21 0	9 0 9	18 2 3
Kalim Mir Sikari ...	0 10 0	0 10 0	0 20 0	1 8 0	6 5 0	3 29 0	2 16 0	4 12 9	19 12 6
Ditto ...	0 15 0	0 15 0	0 30 0	2 4 0	10 34 0	8 2 0	2 32 0	5 9 7	13 6 4
Kudrat Fakir	0 10 0	0 10 0	0 20 0	1 8 0	5 15 0	3 36 0	1 19 0	2 15 2	8 11 0
Sheikh Azim	1 3 0	1 3 0	1 6 0	3 7 6	8 24 0	7 3 0	1 21 0	3 0 9	.....
Ditto ...	0 12 0	0 12 0	0 24 0	1 12 10	6 25 0	4 36 0	1 29 0	3 7 3	8 4 1
Kalim Mir Sikari ...	0 12 0	0 12 0	0 24 0	1 12 10	5 28 0	4 32 0	0 36 0	1 12 9	.....
Jamsat Ali Sheikh ...	0 15 0	0 15 0	0 30 0	2 4 0	8 20 0	6 5 0	2 15 0	4 12 0	10 0 0
Jafar Ali Munshi ...	0 15 0	0 15 0	0 30 0	2 4 0	9 5 0	4 11 13	4 33 3	9 12 0	25 10 0
Jamshat Ali Sheikh ...	2 5 0	2 5 0	2 10 0	6 12 0	25 3 0	17 0 0	8 3 0	16 2 6	1 8 0
Sovah Golam Das ...	1 4 0	1 4 0	1 8 0	3 10 0	16 18 0	9 25 0	6 33 0	13 10 6	25 1 0
Ditto ...	0 15 0	0 15 0	0 30 0	2 4 0	8 0 0	6 6 0	1 34 0	3 11 6	5 14 0
Kashi Golam Das ...	1 10 0	1 10 0	1 20 0	4 8 0	17 12 0	12 4 0	5 8 0	10 6 6	11 13 0
Abdul Sarkar	1 0 0	1 0 0	1 0 0	3 0 0	10 30 0	8 26 0	2 4 0	4 3 0	3 9 0
Ditto	0 10 0	0 10 0	0 20 0	1 8 0	4 25 0	3 36 0	0 29 0	1 7 3	.....
Ditto	0 15 0	0 15 0	0 30 0	2 4 0	7 7 0	6 8 0	0 39 0	1 15 3	.....
Sheikh Abdul	2 0 0	2 0 0	2 0 0	6 0 0	20 10 0	14 30 0	5 20 0	11 0 0	7 8 0
Sheikh Ali	1 10 0	1 10 0	1 20 0	4 8 0	14 34 0	17 30 0	3 4 0	6 3 0	3 6 0
Sheikh Mea Baksh ...	1 10 0	1 10 0	1 20 0	4 8 0	15 5 0	11 0 0	4 5 0	8 4 0	7 8 0
Sheikh Ekahar ...	1 0 0	1 0 0	1 0 0	3 0 0	12 16 0	7 36 0	4 20 0	9 0 0	18 0 0

Bahadurpur, Mymensingh.

Dwarika Nath Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	11 0 0	5 28 9	5 11 7	10 9 0	22 11 0
Ditto ...	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	6 0 0	3 0 0	6 0 0	9 0 0
Muhammad Ismail Sarkar.	1 1 0	1 1 0	1 2 0	3 2 6	9 0 0	6 12 0	2 28 0	5 6 3	6 6 2
Ditto ...	0 6 4	0 6 4	0 12 8	0 15 0	3 20 0	2 20 0	1 0 0	2 0 0	10 5 9
Ishan Ch. Sil	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	6 10 0	2 30 0	5 8 0	7 8 0
Sasia Sheik	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	5 30 0	3 10 0	6 8 0	10 8 0
Samir Zaigirdar ...	1 5 0	1 5 0	1 10 0	3 12 0	12 0 0	6 10 0	5 30 0	11 8 0	18 9 6
Ditto	0 15 0	0 15 0	0 30 0	2 4 0	7 0 0	.....	.....	.....	.....
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	11 0 0	5 28 0	5 17 0	10 13 6	28 8 6
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	10 0 0	6 7 0	3 33 0	7 10 6	13 15 6
Alalexi Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	5 0 0	3 0 0	6 0 0	9 0 0
Maka Sheik	1 0 0	1 0 0	1 0 0	3 0 0	10 0 0	5 30 0	4 10 0	8 8 0	16 8 0
Akhi Sarkar	0 10 0	0 10 0	0 20 0	1 8 0	4 0 0	2 20 0	1 29 0	3 0 0	9 0 0
Kailash Ch. De	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	5 28 9	2 11 7	4 9 0	4 11 0
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	11 0 0	6 20 0	4 20 0	9 0 0	18 0 0
Ditto	1 0 0	.....	1 0 0	3 0 0	10 0 0	.....	.....	.....	.....
Chandra Kishor Sarkar	1 0 0	1 0 0	1 0 0	3 0 0	10 0 0	7 30 0	2 10 0	4 8 0	4 8 0
Ditto ...	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 0 0	2 0 0	4 0 0	3 0 0
Ditto ...	2 0 0	2 0 0	2 0 0	6 0 0	16 0 0	.....	.....	.....	.....
Gaya Gowrow	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 30 0	1 10 0	2 8 0	.....
Sheikh Kalimuddin ...	2 0 0	2 0 0	2 0 0	6 0 0	15 0 0	10 0 0	5 0 0	10 0 0	6 0 0
Kishan Sundar Sarkar	1 0 0	1 0 0	1 0 0	3 0 0	7 30 0	6 0 0	1 30 0	3 8 0	1 8 0
Zalim Sheikh	0 10 0	0 10 0	0 20 0	1 8 0	4 0 0	2 30 0	1 10 0	2 8 0	5 0 0
Alahi Bux	1 0 0	1 0 0	1 0 0	3 0 0	6 0 0	5 0 0	1 0 0	2 0 0	.....

WINTER PADDY WITH BONEMEAL—*continued.*

Bahadurpur, Mymensingh—contd.

CULTIVATOR'S NAME AND ADDRESS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	B. K. C.	B. K. C.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Charagali	2 0 6	2 0 0	2 0 0	6 0 0	11 0 0	10 0 0	1 0 0	2 0 0	Loss.
Amir Sheikh	2 0 0	2 0 0	2 0 0	6 0 0	15 0 0	12 0 0	3 0 0	6 0 0	.....
Zamir Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 0 0	2 0 0	4 0 0	3 0 0
Ditto	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	4 0 0	3 0 0	6 0 0	9 0 0
Naru Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 0 0	2 0	4 0 0	3 0 0
Aru Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	5 0 0	4 0 0	1 0 0	2 0 0	.....
Luzer Khan	1 0 0	1 0 0	1 0 0	3 0 0	7 30 0	5 0 0	2 30 0	5 8 0	7 8 0
Salim Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	7 10 0	6 0 0	1 10 0	2 8 0	.....
Falu Sarkar	2 0 0	2 0 0	2 0 0	6 0 0	10 0 0	9 20 0	0 20 0	1 0 0	Loss.
Hara Kanta Nath ...	1 0 0	1 0 0	1 0 0	3 0 0	7 10 0	6 0 0	1 10 0	2 8 0	.....
Suli Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	11 0 0	7 30 0	3 10 0	6 8 0	10 8 0
Azit Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	5 30 0	5 0 0	0 30 0	1 8 0	Loss.
Changin Garow ...	1 0 0	1 0 0	1 0 0	3 0 0	7 30 0	6 0 0	1 30 0	3 8 0	1 8 0
Karramadin Sheikh ...	0 10 0	0 10 0	0 20 0	1 8 0	3 30 0	3 0 0	0 30 0	1 8 0	.....
Talab Sheikh	2 0 0	2 0 0	2 0 0	6 0 0	8 0 0	7 31 0	0 9 0	0 7 6	Loss.
Surat Sheikh	0 10 0	0 10 0	0 20 0	1 8 0	5 0 0	2 0 0	3 0 0	6 0 0	27 0 0
Ditto	1 10 0	.....	1 20 0	4 8 0	10 0 0	.....	.....	.....	.....
Sarrat Ch. Dutt ...	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 20 0	1 20 0	3 0 0	.....
Nitai Hadi	1 0 0	1 0 0	1 0 0	3 0 0	7 30 0	3 0 0	4 30 0	9 8 0	19 8 0
Damu Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	5 0 0	4 0 0	1 0 0	2 0 0	.....
Barow Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	5 0 0	4 0 0	1 0 0	2 0 0	.....
Kashi Nath Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	7 30 0	5 0 0	2 30 0	5 8 0	7 8 0

Baiganbari, Mymensingh.

Tapu Sircar	1 0 0	1 0 0	1 0 0	3 0 0	8 30 0	8 22 12	0 7 4	0 6 0	Loss.
Saharzamadar	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	4 16 0	3 24 0	7 3 3	12 9 9
Nashiruddin	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 0 0	2 0 0	4 0 0	3 0 0
Hem Ch. Dutta ...	1 0 0	1 0 0	1 0 0	3 0 0	6 20 0	4 0 0	2 20 0	5 0 0	6 0 0
Shajan Mandal ...	1 0 0	1 0 0	1 0 0	3 0 0	8 30 0	5 36 4	2 33 12	5 11 0	8 1 0
Inatulla Munshi ...	1 0 0	1 0 0	1 0 0	3 0 0	8 20 0	8 0 0	0 20 0	1 0 0	Loss.
Rahamatulla Munshi ...	1 2 0	1 2 0	1 4 0	3 4 9	7 0 0	5 0 0	2 0 0	4 0 0	1 14 6
Shahar Mandal ...	1 0 0	1 0 0	1 0 0	3 0 0	5 0 0	3 13 4	1 26 12	3 5 3	0 15 9
Sarup Mandal	1 0 0	1 0 0	1 0 0	3 0 0	6 12 0	4 25 8	1 26 8	3 5 0	0 15 0
Pachai Mandal ...	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	5 8 4	2 31 12	5 9 6	7 12 6
Jaimat Fakir	1 0 0	1 0 0	1 0 0	3 0 0	4 20 0	2 10 0	2 10 0	4 8 0	4 8 0
Azim Mandal	1 0 0	1 0 0	1 0 0	3 0 0	3 30 0	3 3 0	0 27 0	1 5 3	.....

Sharishabari, Mymensingh.

Khudi Mandal	1 10 0	1 10 0	1 20 0	4 8 0	14 0 0	10 20 0	3 20 0	7 0 0	5 0 0
Azimuddin Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	10 0 0	7 0 0	3 0 0	6 0 0	9 0 0
Sayedali Sheikh ...	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 0 0	2 0 0	4 0 0	3 0 0
Shalai Sarkar	0 10 0	0 10 0	0 20 0	1 8 0	3 0 0	2 0 0	1 0 0	2 0 0	3, 0 0,
Rafetulla Sarkar ...	0 10 0	0 10 0	0 20 0	1 8 0	3 0 0	2 0 0	1 0 0	2 0 0	3 0 0
Alep Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 0 0	2 0 0	4 0 0	3 0 0

WINTER PADDY WITH BONEMEAL—*concluded.*

Sharishabari, Mymensingh—concld.

NAME AND ADDRESS OF CULTIVATORS.	AREA.		MANURE.		OUTTURN.		DIFFERENCE.		Profit per acre.
	Manured.	Unmanured.	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	A. R. P.	A. R. P.	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Sabed Ali Bhuiaw	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 20 0	1 20 0	3 0 0	...
Taslin Mudi	1 0 0	1 0 0	1 0 0	3 0 0	6 0 0	4 20 0	1 20 0	3 0 0	....
Khudi Fakir	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	5 10 0	1 30 0	3 8 0	1 8 0
Shaheballa Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 5 0	1 35 0	3 12 0	2 4 0
Ahamed Khan	0 5 0	0 5 0	0 10 0	0 12 0	1 20 0	1 0 0	0 20 0	1 0 0	3 0 0
Kashi Sheikh	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	6 0 0	3 0 0	6 0 0	9 0 0
Samit Mandal	0 10 0	0 10 0	0 20 0	1 8 0	4 0 0	2 25 0	1 15 0	2 12 0	7 8 0

Raj Cutcherry, Trisul, Mymensingh.

Pirmamud Mirdha ...	1 4 0	1 4 0	1 8 0	3 10 0	9 10 0	8 16 0	0 34 0	1 11 3	...
Ditto ...	1 0 0	1 0 0	1 0 0	3 0 0	8 25 0	4 33 5	3 31 11	7 9 3	13 11 9
Ijjat Ali Sarkar ...	1 4 0	1 4 0	1 5 0	3 10 0	10 0 0	8 16 0	1 24 0	1 3 3	...
Ditto ...	1 12	1 12 0	1 24 0	4 13 0	10 10 0	8 17 2	1 32 14	3 10 3	...
Sayed Ali Sarkar ...	1 0 0	1 0 0	1 0 0	3 0 0	9 10 0	5 10 12	3 39 4	7 15 3	14 13 9
Tamizuddin Mandal ...	1 0 0	1 0 0	1 0 0	3 0 0	8 0 0	6 0 0	2 0 0	4 0 0	3 0 0
Bhringa Sheikh ...	1 0 0	1 0 0	1 0 0	3 0 0	9 0 0	5 31 4	3 8 12	6 7 0	10 5 0
Madar Sheikh	1 4 0	1 4 0	1 8 0	3 10 0	7 25 0	6 12 0	1 13 0	2 10 6	...
Tarip Sheikh	1 4 0	1 4 0	1 8 0	3 10 0	8 15 0	7 36 12	0 18 4	0 14 6	...
Mabor Ali Sarkar ...	1 8 0	1 8 0	1 16 0	4 3 0	9 35 0	10 6 0	...	...	...
Baikunta Ch. Sil	1 0 0	1 0 0	1 0 0	3 0 0	8 26 0	5 10 0	3 25 0	7 4 0	12 12 0

Madhupur, Mymensingh.

Ram Gh. De, Madhupur	1 15 0	1 15 0	1 30 0	5 4 0	12 0 0	10 0 0	2 0 0	4 0 0	...
Ditto, ditto	1 15 0	1 15 0	1 30 0	5 4 0	10 0 0	10 0 0	...	...	...
Sheikh Tamoo, ditto	1 10 0	1 10 0	1 20 0	4 8 0	10 0 0	8 20 0	1 20 0	3 0 0	...
Sheikh Manoo, ditto	1 3 0	1 3 0	1 6 3	3 7 3	6 20 0	5 0 0	1 20 0	3 0 0	...

Result of Potato Demonstrations.

(Gaffargaon, Mymensingh.)

Name of cultivator.	Area.	Quantity of seeds.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Rai P. K. Chakrabartti Bahadur.	0 4 0	0 36 0	2 26 0
Abdul Rahaman Sarkar ...	0 4 0	0 20 0	4 0 0
Gani Mahamud Sarkar ...	0 4 0	0 20 0	1 36 0
Abdul Sarkar	0 8 0	1 0 0	6 0 0
Iachin Sarkar	0 8 0	1 0 0	4 20 0
Jamir Sarkar	0 4 0	0 20 0	2 20 0
Sheik Kala Sardar	0 1 0	0 5 0	0 30 0
Myandhar Khan	0 1 0	0 5 0	0 27 0
Ismail Munshi	0 1 0	0 5 0	0 35 0
Sheik Ibrahim	0 2 0	0 10 0	1 10 0
Ismail Khandu Kar ...	0 2 0	0 10 0	1 30 0
Inchan Golandaz	0 2 0	0 10 0	1 25 0
Samserali Sarkar	0 6 0	0 30 0	4 30 0
Abdul Sarkar	0 12 0	1 15 0	18 0 0
Jamir Sarkar	0 2 0	0 10 0	1 25 0
Sheik Kudrat Fakir ...	0 4 0	0 20 0	6 0 0
Muhammad Nazimuddin ...	0 12 0	1 30 0	8 0 0
Aswini K. Chowdhury, Jailor, Mymensingh Jail.	1 0 0	3 0 0	34 0 0
Station Master, Mymensingh Station.	0 1 0	0 6 0	1 35 0

Muktagacha, Mymensingh.

	B. K. CH.	M. S. CH.	M. S. CH.
Sheku Bepari	0 4 0	0 20 0	5 0 0
Arman Serior	0 4 0	0 20 0	5 20 0
Umedali Sheikh	0 1 0	0 5 0	1 0 0
Shahebali	0 2 0	0 10 0	2 20 0
Nazashani Sheikh	0 1 0	0 5 0	1 5 0
Aju Sheikh	0 1 0	0 5 0	1 10 0
Rahai Sheikh	0 1 0	0 5 0	1 2 0

RESULT OF POTATO DEMONSTRATIONS—*continued.*

Muktagacha, Mymensingh—concluded.

Name of cultivator.	Area.	Quantity of seeds.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Akin Sheikh	0 1 0	0 5 0	1 2 0
Rakmar Sheikh	0 2 0	0 10 0	2 15 0
Lekat Fakir	0 1 0	0 5 0	1 20 0
Rahamat Sheikh	0 1 0	0 5 0	1 15 0
Jaga Ch. Deb	0 0 8	0 2 8	0 30 0
Kalu Sheikh	0 4 0	0 20 0	5 10 0
Prossana K. De	0 6 0	0 30 0	7 20 0
Gopal Ch. Mukharji ...	0 4 0	0 20 0	5 10 0
Bijoy K. De	0 4 0	0 20 0	5 30 0
Durga Prasad Bal	0 0 8	0 2 8	0 25 0
Ramesh Ch. Sanagal ...	0 4 0	0 20 0	5 5 0
Jagendra K. Roy	0 4 0	0 20 0	5 15 0

Kalirbazar, Mymensingh.

	B. K. CH.	M. S. CH.	M. S. CH.
Prossana Kumar	0 1 0	0 10 0	1 25 0
Ramdeb	0 2 0	0 15 0	2 8 0
Abhoy Kumar Sarkar ...	0 6 0	1 20 0	10 0 0
Broza Nath Dutta	0 4 0	0 30 0	6 0 0
Jabari Sheikh	0 7 0	1 2 0	7 0 0
Kula Chandra Pramanik ...	0 2 0	0 26 8	2 0 0
Naru Bepari	0 1 0	0 10 0	1 18 0
Tahir Muhammad, Nandina ...	0 5 0	0 30 0	5 0 0
Mamudati Shekh, Nandina ...	0 10 0	1 20 0	15 0 0
Sheikh Matrin, Nandina ...	0 4 0	0 30 0	14 0 0
Imanali Sheikh, Nandina ...	1 0 0	3 0 0	30 0 0
Sheikh Abdul Rahaman, Kalikapur.	0 15 0	3 0 0	25 0 0
Abdul Baksha, Kalikapur ...	1 10 0	6 0 0	54 0 0
Sheikh Mamir Sarkar, Kalikapur.	2 10 0	10 0 0	100 0 0
Imam Ali Sarkar, Kalikapur ...	1 5 0	5 0 0	40 0 0

RESULT OF POTATO DEMONSTRATIONS—*continued.*

Kishorganj, Mymensingh.

Name of cultivator.	Area.	Quantity of seeds.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Joy Chandra Chakrabutty ...	0 3 0	0 15 0	3 0 0
Lalit Chandra Barman ...	0 1 0	0 6 0	2 8 0
Bhairab Chandra Chowdhury ...	0 12 0	2 0 0	8 0 0
Azimuddin Munshi ...	0 2 0	0 10 0	4 0 0
Shyam Gobinda Barman ...	0 1 0	0 5 0	0 34 0
Prakash Chandra Nandy ...	0 1 0	0 8 0	2 0 0
Kali Prossana Chakrabutty ...	0 1 0	0 7 0	1 0 0
Gaya Prosad Chakrabutty ...	0 1 0	0 6 0	2 8 0
Kamini K. Barman	0 1 0	0 4 0	1 10 0
Purna Chandra Roy ...	0 1 0	0 5 0	1 10 0
Mahim Chandra Saha ...	0 1 0	0 5 0	0 30 0
Bepin Chandra Roy ...	0 1 0	0 6 0	2 30 0
Prassana K. Pakrashi ...	0 10 0	2 0 0	8 0 0
Kisory Lal Sen Gupta ...	0 2 0	0 10 0	4 0 0
Abdul Sobhan	0 1 0	0 5 0	1 0 0
Umesh Chandra Barman ...	0 1 0	0 4 0	1 0 0
Hashmat Munshi	0 2 0	0 10 0	1 20 0
Shyama Charan Mazumdar ...	0 2 0	0 12 0	2 0 0

Jamalpur, Mymensingh.

	B. K. CH.	M. S. CH.	M. S. CH.
Indu Sarkar	1 5 0	8 0 0	49 20 0
Banku Sheikh	0 15 0	5 0 0	24 0 0
Sharitullay Sheikh	0 10 0	3 0 0	18 0 0
Madari Akanda	0 15 0	5 0 0	23 0 0
Abaka Sheikh	0 5 0	2 0 0	10 0 0
Shealu Sheikh	0 5 0	2 0 0	9 0 0
Agar Munshi	0 5 0	2 0 0	11 0 0

RESULT OF POTATO DEMONSTRATIONS—*continued.*

Jamalpur, Mymensingh—concluded.

Name of cultivator.	Area.	Quantity of seeds.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Naim Sarkar	1 0 0	5 0 0	10 0 0
Nayabulla Fakir	0 15 0	5 0 0	15 0 0
Rahimuddin Munshi ...	1 0 0	5 0 0	20 0 0
Surendra N. Dutta	0 5 0	2 0 0	14 0 0
Bisseswar Roy	0 3 0	1 0 0	5 0 0
Haran Mir	0 5 0	2 20 0	13 0 0
Umesh Chandra De ...	0 1 0	0 7 8	1 0 0
Mohini Ch. De, Gunzium ...	0 10 0	2 0 0	12 0 0
Chandra N. Guha, Tangail ...	0 5 0	1 0 0	5 0 0

Mymensingh.

NAME OF CULTIVATOR.	Address of cultivator.	Area of land in acres.	OUTTURN.		REMARKS.
			SELECTED.	UNSELECTED.	
			MDS. S. CH.	MDS. S. CH.	
Nohez Sheikh ...	Berahathalia...	·15	3 20 0	3 15 0	
Taezuddin ...	Ditto ...	·25	4 15 0	4 10 0	
Nazir Muhammad ...	Ditto ...	·33	7 8 0	7 5 0	
Lammamud Sarkar ...	Godasunda ...	·33	6 35 0	6 10 0	
Nanda Kumar Sen ...	Kumree ...	·25	5 22 0	5 12 0	
Abdul Mazid ...	Barshikora ...	·25	4 30 0	4 20 0	
Sanatram Shaha ...	Media ...	·20	3 20 0	3 10 0	
Hauluddin Khan ...	Kattee ...	·16	2 22 0	2 16 0	
Amchar Khan ...	Do. ...	·17	2 35 0	2 30 0	
Dhirendra M. Roy ...	Shibani ...	·10	2 10 0	2 10 0	
Mohiuddin Muktear ...	Meddli ...	·33	6 30 0	6 30 0	
Santi Ch. Mazumdar ...	Thakurakona...	·20	4 30 0	4 15 0	
Goyanath Dey Sarkar ...	Ditto ...	·25	5 3 0	5 3 0	
Bhusan Namasudra ...	Ditto ...	·16	2 16 0	2 6 0	
Akkabally Daftry ...	Rajirbag ...	·10	2 4 0	2 3 0	Plants from selected seeds grew uniformly and well. The fibre superior in colour and strength.
Akali Sheikh	Malansi ...	·33	6 6 0	6 3 0	Ditto ditto.
Easin Sarkar	Ashura ...	·25	5 12 0	5 0 0	Ditto. ditto.

AME OF CULTIVATOR.	Address of cultivators.	Area of land in acres.	OUTTURN.						REMARKS.
			SELECTED.			UNSELECTED.			
			MDS.	S.	CH.	MDS.	S.	CH.	
Kabit Munshi... ...	Ashura ...	·20	4	12	0	4	10	0	
Jinnatali Ahmed ...	Akashi ...	·40	7	22	0	7	5	0	
Goba Sheikh	Do. ...	·33	6	30	0	6	22	0	
Rupa Mondul... ...	Do. ...	·20	3	37	0	3	33	0	
Sharu Mondul... ...	Do. ...	·25	5	10	0	4	34	0	
Imuddin Ahamed ...	Kuralia ...	·10	1	35	0	1	30	0	
Intazuddin Khandakar ...	Dawhara ...	·15	2	27	0	2	5	0	
Abdul Zabber Kaji ...	Malawri ...	·17	3	25	0	3	10	0	
Taripuddin	Mohonpur ...	·33	7	20	0	7	10	0	
Iretulla Sheikh ...	Ditto ...	·20	4	25	0	4	0	0	
Mandulla Sarkár ...	Gorarkandu ...	·25	4	30	0	4	20	0	
Namber Sheikh ...	Berhathalia ...	·10	2	10	0	2	6	0	
Kalim Sarkar... ...	Seelashi ...	.33	6	18	0	6	3	0	
Krishna Chandra Dey ...	Saltia ..	·33	7	20	0	7	20	0	
Barkatulla Munshi ...	Seelashi ...	·17	3	10	0	3	10	0	
Abdul Rahaman Sarkar ...	Bagua ...	·15	3	10	0	3	5	0	
Ibrahim Sarkar ...	Do. ...	·20	4	0	0	3	38	0	
Ilia Sheikh	Bolashpur ...	·25	5	35	0	5	20	0	
Galim Mondul ...	Bolashpur ...	·15	2	17	0	2	5	0	
Setu Mondul	Golgonda ...	·20	3	18	0	3	18	0	
Zabbar Sheikh ...	Ditto ...	·10	2	15	0	2	15	0	
Abbas Ali Sarkar ...	Katlasen ...	·25	3	36	0	3	33	0	
Zami Munshi... ...	Akua ...	·33	7	0	0	6	15	0	
Ismail Sarkar... ...	Do. ...	·15	4	0	0	3	18	0	
Makim Raj	Do. ...	·20	3	30	0	3	25	0	
Azu Sheikh	Solakia ...	·25	4	39	0	4	22	0	
Rushunath Sheikh ...	Ghatail ...	·10	2	20	0	2	14	0	
Surat Ali Sheik ...	Charsutakia ...	·33	7	6	0	7	3	0	
Mahamud Charu ...	Ghatail. ...	·25	5	24	0	5	24	0	
Mamud Ali Sheikh ...	Ditto ...	·15	3	33	0	3	20	0	
Sheikh Azam ...	Sridharkhila ...	·20	4	38	0	4	30	0	

Bonemeal demonstration on Aus.

Faridpur.

Name and address of cultivators.	Area.		Manure		Cutturn.		Difference.		Profit per acre.
	Manured.	Unmanured	Quantity.	Price.	Manured.	Unmanured.	Quantity.	Price.	
	A. R. P.	A. R. P	M. S. CH.	Rs. A. P.	M. S. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.
Moulvi Ahiduabi ...	1 0 0	1 0 0	1 0 0	3 0 0	1 30 0	1 10 0	0 20 0	1 0 0	Loss.
Uma Ch. Mandal, Hossanakhali.	0 14 0	0 14 0	0 24 0	1 12 5	1 32 0	1 8 0	0 24 0	1 3 0	Loss.

Bonemeal on Winter Paddy.

Faridpur.

Maulvi Ahadauabhi ...	1 0 0	1 0 0	1 0 0	3 0 0	7 0 0	6 10 0	0 30 0	1 8 0	Loss.

Faridpur.

	B. K. CH.	M. S. CH.	M. S. CH.
Ashutosh Bhowmik ...	0 5 0	1 0 0	7 0 0
Kedar Mondal	0 8 0	2 0 0	8 0 0
Ketabdi Matbar	0 18 0	3 0 0	12 0 0
Arjun Matbar	1 0 0	4 20 0	16 0 0
Shaik Gani	0 5 0	1 10 0	3 20 0
Jaharuddi	0 5 0	1 10 0	4 0 0
Paramulla	0 6 0	1 10 0	4 20 0
Muhammad Abdul Wahed ...	0 2 0	0 15 0	1 0 0
Muhammad Abdul Gaffur ...	0 4 0	0 35 0	3 0 0
Mogal Chaprasi	0 5 0	1 0 0	5 0 0
Samiruddin	0 5 0	1 0 0	5 0 0
Jehar Munshi	0 5 0	1 0 0	3 0 0

Gopalganj, Faridpur.

	B. K. CH.	M. S. CH.	M. S. CH.
S. M. Bose	0 11 0	3 20 0	35 0 0
Purna Ch. Mullick	0 17 0	5 0 0	40 0 0

RESULT OF POTATO DEMONSTRATIONS—*continued.*

Gopalganj, Faridpur—concluded.

Name of cultivator.	Area.	Quantity of seeds used.	Outturn.
	B. K. CH.	M. S. CH.	M. S. CH.
Sital Ch. Biswas	0 10 0	2 20 0	20 0 0
Kailash Ch. Roy	0 15 0	3 0 0	30 0 0
Ram Kanai Roy	0 15 0	3 0 0	30 0 0
Kanai Biswas	0 12 8	2 0 0	17 0 0
Panchanan Biswas	0 9 0	1 0 0	12 0 0
Hafizuddin Mollah	0 8 0	1 0 0	11 0 0
Kailash Ch. Karmakar ...	0 1 8	0 20 0	4 0 0
Dr. R. K. Bose	0 2 0	0 20 0	4 0 0
Sirish Ch. Chakrabarti ...	0 1 0	0 15 0	1 0 0
Kali Charan Mondal ...	0 3 0	0 20 0	3 0 0
Khirod Ch. Roy	0 0 8	0 5 0	0 12 0

REPORT OF DEMONSTRATION WORK, RAJSHAHI DIVISION, 1913-14.

DURING the year 1913-14, I was assisted by a staff of ten demonstrators. There are three demonstrators in the Rajshahi district, two in Pabna, one in Malda, two in Bogra one in Dinajpur and one in Jalpaiguri.

The main items of demonstration were (1) bonemeal for winter-paddy, (2) superiority of the Darjeeling and Naini Tal varieties of potatoes to the local, (3) conservation of cowdung in covered pits, (4) green-manuring of the winter-paddy with *Dhaincha* and potatoes with cowpea, (5) residual demonstration in bonemeal, (6) introduction of the better classes of sugarcane in some of the districts, and (7) seed selection in the fields.

Bonemeal demonstrations.—There were altogether 74 plots receiving bonemeal under me. Of these, ten were sown with *Aus* paddy and the rest with *Aman*. (Originally the number was 100, of which 23 were damaged by various natural troubles and three eaten up by trespassing cattle.)

The distribution of plots was as follows :—

Rajshahi	18
Bogra	14
Dinajpur	9
Pabna	12
Malda	3
Jalpaiguri	18
Total	74

The results were very encouraging in some of the places. The manure was highly successful in 56 plots. Of the remaining 18, six were fairly successful and the rest indifferent.

The varieties of paddy with which the manure was used were *Natpasha*, *Kumragair*, *Mugi*, *Elai*, *Kataribhog*, *Guge*, *Pakhiraj* and *Tulapanjee*.

Potato demonstration.—With the seeds at my disposal I established 179 plots, out of which 79 belonged to private individuals taking care of their own lands and the rest were under our direct supervision.

The distribution of plots was as follows :—

Rajshahi	36
Pabna	11
Bogra	13
Dinajpur	26
Jalpaiguri	11
Malda	3
Total	100

Taking into consideration everything, potato seems to be the crop for the districts of Rajshahi, Bogra, and Jalpaiguri. About 75 to 80 maunds per bigha, according to circumstances, may be put as a fair outturn for the above mentioned districts. Last year the highest yield obtained with Darjeeling seeds was 97 maunds to the bigha.

Potato has been newly introduced into some parts of Rajshahi (Godagari side) Bogra and Pabna with very encouraging results.

The Darjeeling variety seems to be the most successful throughout the division.

Manure pits.—There are at present 97 manure pits under my supervision. The work is extending, though very slowly, as the cultivators cannot see the advantages of such pits over uncovered ones as easily as in the other cases.

Green-manuring.—*Dhaincha* and cowpea have both been used for this purpose. There were 22 fields receiving green-manuring last year, and all of them, except one, gave a distinctly good result.

Sugarcane.—Cuttings of *Gendari*, *Shamsara* and *Vendamukhi* were distributed among cultivators. These cuttings are in great demand. They are undoubtedly superior to the local varieties.

Seed selection.—Seeds have been selected from 39 plots of land and are being tried this year. The results have not yet been obtained.

Miscellaneous information.—New private farms established and inspected by me—

Jalpaiguri	2
Pabna	3
Rajshahi	4
Dinajpur	1
Total	10

		Maunds.
Bonemeal—		
First supplied		280
Supplied later		36
Supplied to Churaman ward		25
	Total ...	341
Potato seeds supplied—		
Naini Tal		200
Darjeeling		15
Last year's seeds		10
	Total ...	225
Implements sold—		
Meston plough		50
Planet junior hand-hoe		20
Implements distributed—		
Planet junior hand-hoe		10
Meston plough		10
Ditto for Churaman		12
Sprayer		2
Sugarcane-crushing Mill		1

N. N. GUPTA,

Agricultural Supervisor.

1 Bigha = 80 × 80 cubits.
1 Seer = 80 tolas, 1 Maund = 40 seers.

No.	Quantity of land each both manured and unmanured.	Yield.		Difference.	Difference per bigha.	Price of difference at Rs. 2-8 a maund.
		Manured plot.	Unmanured plot.			
		M. s.	M s.	M. s.	M. s.	Rs. A.
1	10 Cottahs	5 30	4 5	1 25	2 10	5 10
2	Ditto	4 9	4 0	0 9	0 18	1 2
3	Ditto	5 15	4 30	0 25	1 10	3 2
4	1 Bigha	9 0	7 5	1 35	1 35	4 11
5	Ditto	9 0	7 0	2 0	2 0	5 0
6	Ditto	8 0	7 30	0 10	0 10	0 10
7	Ditto	9 15	5 39	3 16	3 16	8 8
8	Ditto	10 0	7 5	2 35	2 35	7 3
9	9 Bigha	3 0	2 20	0 20	1 0	2 8
10	13 Cottahs ...	6 30	5 0	1 30	3 15	8 7
11	1 Bigha	9 13	8 2	1 11	1 11	3 3
12	10 Cottahs	3 7	2 10	0 37	1 34	4 10
13	1 Bigha, 15 cottahs ...	12 4	10 0	2 4	1 8	3 0
14	15 Cottahs ...	6 9	5 10	0 39	1 12	3 4
15	1 Bigha	4 36	4 6	0 30	0 30	1 14
16	10 Cottahs	3 15	3 4	0 11	0 22	1 6
17	Ditto	3 5	2 27	0 18	0 36	2 4
18	1 Bigha	7 10	6 4	1 6	1 6	2 14
19	10 Cottahs	3 8	2 30	0 18	0 36	2 4
20	15 Cottahs	6 4	5 20	0 24	0 32	2 0
21	1 Bigha	9 12	8 0	1 12	1 12	3 4
22	10 Cottahs	4 10	3 30	0 20	1 0	2 8
23	1 Bigha, 10 cottahs ...	12 0	10 5	1 35	1 10	3 2
24	10 Cottahs	4 10	3 5	1 5	2 10	3 2
25	1 Bigha	7 5	5 10	1 25	1 25	4 1
	Total ...	...	...	...	...	90 15

Average gain per bigha = Rs. $\frac{89-9}{25}$ = Rs. 3—9, per bigha.

REPORT ON THE AGRICULTURAL DEMONSTRATIONS IN THE DISTRICT OF RANGPUR, 1913-14.

Staff.

Babu Benode Lal Mukerjee was in charge of the demonstrations in this district throughout the year. He joined on the 4th June 1913. The District Agricultural Officer spent 196 days on tour, part of which was spent in checking jute schedules. He had four demonstrators under him. The demonstrations in this district were carried out mostly through the members of the District Agricultural Association, many of whom are cultivators themselves, and through the Court of Wards, which placed Rs. 500 at the disposal of the Department. I beg to take this opportunity of thanking Babu Ramesh Chandra Das, General Manager of Court of Wards, who assisted us in various ways. The membership of the District Agricultural Association rose from 37 to 95 during this year.

Demonstrations.

The demonstrations may be divided under the following heads:—

(1) Bonemeal on winter paddy.
(2) Introduction of hill potatoes.
(3) Introduction of Meston ploughs and Planet Junior hand-hoes.
(4) Seed selection—jute and paddy.
(5) Conservation of cowdung.

(1) *Bonemeal.*—The manure was received too late to be applied on double-cropped land as the *Aus* is sown very early in this District (March and April). Sixty maunds of bonemeal was actually applied, but only in six places comparative results could be obtained. Appendix I shows the results, which are not very encouraging. There is hardly any doubt that in some of those places where comparative results could not be obtained, the bonemeal gave satisfaction to the raiyats, as 70 maunds of bonemeal was supplied this year on the spontaneous application of the raiyats. This year the bonemeal has been applied mainly on double-cropped land, and comparative results from all the plots will be obtained.

(2) *Cultivation of hill potatoes.*—There was a considerable demand for Darjeeling potatoes. One hundred and eighty-five maunds of potatoes were distributed among 134 people. About half the men who grew the Darjeeling seed the previous year again took seed during the year under report. The average outturn obtained for all the plots was 32 maunds per bigha; but this includes some plots which were very carelessly cultivated and not manured at all. The best results were obtained by Babus Satis Chandra Mukherjee and Bidhu Bhushan Mukherjee, of Tushbhandar, who obtained 120 and 70 maunds per bigha, respectively. It may be noted here that the average outturn of the country potato hardly exceeds 20 maunds per bigha. It was not possible to make any comparative tests, as very few cultivators would grow more than 4 or 5 cottahs (about 1-15 acre) of potato, and it is impossible to get any reliable results if this is again divided into halves.

An attempt will be made next season to induce a few cultivators to grow larger areas and obtain comparative results, by supplying, if necessary, hill potato at a reduced rate. A statement (Appendix II) is annexed, showing the results actually obtained.

(3) *Introduction of improved implements.*—Ninety Meston ploughs were sold among as many people in 22 villages. The result is very encouraging, considering that this is the first year that any serious attempt was made in this direction. The most hopeful feature is that the people are paying the prices without any objection. Eight hand-hoes have also been sold.

(4) *Seed selection.*—Seeds from the best hundred plants were selected from 12 jute plots. These have been sown alongside with cultivators' seed this year and the outturn of the two plots will be weighed separately. The jute from the selected seeds is reported to be doing better.

Seeds from winter paddy were selected from eight plots.

(5) *Conservation of cowdung.*—One hundred and twenty cultivators, distributed over 22 villages, were induced to place their cowdung and urine in covered pits, instead of in the open, exposed to sun and rain, as at present. The manure will be ready for use next winter, and an attempt will be made to compare the effect of this manure with that of ordinary manure.

Summary.

The best results have been obtained in the following lines:—

(1) Introduction of implements.
(2) Conservation of cowdung.
(3) Selection of jute seeds.

We should, in this district, concentrate our energies mainly on these things. The reasons are not very far to seek. Jute is one of the best paying crops in this district, and anything which will increase the yield of jute will be greatly appreciated by the raiyats—hence the comparative success of the manure pits and jute seed selection. On

account of the dearth of labour, any labour-saving implement is also greatly welcome. A determined effort will be made to introduce hand-hoes among the potato and tobacco growers next season.

Two apprentices are being trained at Burirhat Farm and will be available for demonstration work next year.

It may be noted that most of the above work was carried out with very little expenditure to Government. Almost all the seed and manure was paid for by the cultivators and the Agricultural Association. The demonstrations could be easily extended further, provided there were enough demonstrators. The four men have now as much as they can supervise, and it is not proposed to extend the area of their activities until they have made some permanent impression in the places where they are located. For the first few years, even after the utility of certain agricultural improvements has been definitely demonstrated, the demonstrators must continually watch and assist the cultivators to see that they do not fall back on their old methods.

PROGRAMME FOR NEXT YEAR (1914-16.)

The programme of work for 1914-15 is annexed as Appendix III.

J. N. CHAKRABATTI.

Agricultural Supervisor.

The 14th July 1914.

APPENDIX I.

Bonemeal demonstrations.

	Paddy.		Total increase per bigha.		Value of increase at Rs. 3 per maund.		Net profit per bigha after deducting cost of manure.		Net loss per bigha after deducting cost of manure.	
	Mds.	Srs.	Mds.	Srs.	Rs.	As. P.	Rs.	As. P.	Rs.	As. P.
Manured	12	30	1	24	4	13 0	1	9 0	.....	
Unmanured ...	3	20								
Manured	5	6½	0	26	1	15 3	.....		2	15 6
Unmanured ...	4	20¼								
Manured	9	0	1	26¼	4	15 6	1	11 6	.....	
Unmanured ...	8	0								
Manured	4	16	0	16	1	3 3	.....		2	0 9
Unmanured ...	4	0								
Manured	4	0	1	27	5	0 6	1	12 6	.....	
Unmanured ...	2	20								
Manured	.....		.....							
Unmanured ...	.....		.....							

APPENDIX II.

Potato demonstrations.

Name	Area of land.			Amount of outturn.			Outturn per bigha.	Remarks.
	B.	K.	Ch.	Mds.	Srs.	Ch.	Mds.	
Gour Mohan Sarkar... ...	0	1	0	2	28	0	54	
Ram Chandra Das (I) ...	0	4	8	8	38	0	40	
Bisvambar Das	0	3	1	5	25	0	37½	
Foullya Das	0	1	12	4	35	0	56	
Kheru Das	0	1	8	2	23	0	34	
Sham Chandra Das ...	0	2	8	1	16	0	11	Sown very late.
Chatu Das	0	1	10	1	29	0	36	
Ram Chandra Das (II) ...	0	1	10	1	32	0	25½	
Kali Basu	0	2	0	3	10	0	32½	
Nizam-uddin Sarkar ...	0	8	0	13	20	0	34	Bonemeal.
Ghachu Das	0	2	8	9	15	0	34	
Bidhu Bhushan Mukharji ...	0	3	8	10	0	0	60	Cowdung.
	0	3	8	14	0	0	84	Mustard cake.
Gobinda Chandra Roy ...	0	3	8	8	10	0	24	
Hasil Mamud (c)	0	0	15	0	28	0	15	
	0	0	15	1	2	0	22½	
Kukoor Sheik	0	0	14	1	0	0	24	
Pramatha Babu	0	0	12	1	10	0	35½	
Mathuresh Babu	0	0	8	0	28	0	28	
Salimuddin	0	0	12	0	35	0	24	

Gaibandha.

NAME.	Area of land.		Amount of outturn.		Outturn per bigha.		Value per bigha at Rs. 2 per maund.		
1	2		3		4		5		
	B.	K.	MD.	SRS.	MD.	SRS.	RS.	AS.	P.
Babu Mian	2	12	99	10	38	2½	76	2	0
Najle Rahamân Sarkar ...	0	3½	7	0	40	0	80	0	0
Karimulla Akond ...	0	11	10	6	19	0	38	0	0
Modhu Sudhan Das Gupta ...	0	2⅔	6	0	50	0	100	0	0

Kurigram.

	B.	K.	MD.	SRS.	MD.	SRS.	RS.	AS.	P.
Rahi Muddin Mian ...	0	4½	5	0	22	8	44	7	0
Ekamber Mian	0	4⅝	5	0	20	10	40	8	0
Hedatulla	0	4⅝	5	0	20	10	40	8	0
Fakaruddin Muktear ...	0	5	15	0	60	0	120	0	0
Safaruddin Mian	0	5	15	0	60	0	120	0	0
Jabra Dalal	0	3 9/16	9	0	51	20	103	0	0
Keshmatulla	0	3¼	5	0	30	30	61	8	0
Maimuddin Mian	0	3	4	0	26	26	53	5	0
Rezzaq Muktear	0	5	10	0	40	0	80	0	0
Kharga Sarkar	0	2½	3	0	24	0	48	0	0

Sadar.

	B.	K.	MD.	SRS.	MD.	SRS.	RS.	AS.	P.
Madhab Babu	0	12	20	0	33	15	66	12	0
Babu Keshab Ch. Roy's Pesker ...	0	10	22	0	44	0	88	0	0

APPENDIX III.

Programme of work for 1914-15.

1.	Bonemeal	... 60 Maunds have been distributed most of which have already been paid for.
2.	Introduction of improved seed	... 22½ Maunds of improved varieties of paddy (Kataribhog and Badshabhog) have been distributed.
3.	Green manure crops ...	... 6½ Maunds of cowpea (to sow 25 bighas) and two maunds of Dhaincha have been sown.
4.	Hill potatoes	... The cultivation of hill potatoes will be continued as before.
5.	Conservation of cowdung	... Manure pits will be erected as before. An attempt will be made to demonstrate the manurial value of conserved cowdung, as compared with cowdung left exposed to sun and rain.
6.	Miscellaneous ...	... Two gentlemen have grown joar and one gentleman is trying groundnut.
7.	Seed selection ...	... The seed of jute and paddy selected last year is being grown in plots alongside plots of equal area and similar quality sown with seed which has not been selected. Further selection will be carried out this year.
8.	Introduction of improved implements	... The introduction of Meston ploughs and hand-hoes will be pushed on. The use of chain pump and chaff-cutter will be demonstrated.

DEMONSTRATION WORK IN THE CHITTAGONG DIVISION DURING 1913-14.

THE following demonstrations were carried on :—

(*a*) Use of bonemeal as a manure for paddy, both *aus* and *aman*.
(*b*) Potato cultivation.
(*c*) Selection of seed of *aus* and *aman* paddy and of jute.
(*d*) Conservation of cattledung.

(*a*) *Use of bonemeal as a manure for paddy.*—In the three districts of the Chittagong Division in my charge there were, during the year under report, 67 demonstration plots under bonemeal—

	Plots.
Tippera (Sadar Subdivision)	12
Brahmanbaria	12
Chandpur	15
Noakhali	12
Chittagong	16
Total ...	67

Out of this number, the crop failed totally in nine plots and partially in six, owing to heavy floods in October 1913. Out of the remaining 52 plots, in 40 cases the manured half yielded an average profit of Rs. 15-10 over the unmanured half. The increased outturn in five other cases just covered the cost of the manure. Only in six cases did the manured half show a loss. Some of these plots were afterwards found to be acid, requiring liming, while one or two were found to be saline.

For the current year (1914-15) I have ordered for 90 maunds of bonemeal for demonstration purposes. It is, however, very gratifying to note that as a result of last year's demonstration work we have received private orders for bonemeal from cultivators in various parts of the Division thus :—

	Maunds.
Chandpur	10
Comilla	48
Noakhali	33½
Brahmanbaria	35
Chittagong	6
Total ..	132½

It is found that heavy rains wash out the manure. During the year under report we had an exceptionally large number of rainy days in March, April and May, preventing the application of the manure. It seems necessary, therefore, that it should be applied earlier in the season, not later than the middle of February.

2. Bonemeal of course is practically a phosphatic manure. There is, however, a great demand for a nitrogenous manure for jute, as cowdung is becoming increasingly costly and scarce. Green-manuring with *rabi kalai* may be experimentally tried before recommending it to the raiyat.

(*b*) *Potato cultivation.*—Potatoes appear to be grown only to a very limited extent in parts of Brahmanbaria (Tippera) and of Satkania (Chittagong), and these potatoes are small in size and glutinous in texture when cooked. An attempt was made during the year to popularize the cultivation of Naini Tal potatoes by distributing 25 maunds of them free among selected raiyats and by showing them the most approved method of raising the crop. No manure was used on the *char* lands, but elsewhere dung was used. The average outturn was 98 maunds and a net profit of Rs. 217 per acre, though the size of the tubers was small. As a result we had before the close of July already received private orders for 74 maunds of seed potatoes from people who are ready to pay for them. Some damage to the crop was done by the potato-beetle, but the *char* lands escaped. Hand-picking was the only remedy recommended. Fortunately no outbreak of *Phytophthera* or the potato-blight was reported from anywhere.

During the current year I propose to carry on the demonstration more extensively, and with the Darjeeling variety, which is more prolific than the Naini Tal variety. I also propose to introduce the use of the Planet Junior hand-hoe, which will materially reduce the cost of cultivation.

(*c*) *Selection of seed.*—The raiyat generally uses anything as seed. The principle of selecting individual good plants for seed is not known. During the year under report an attempt was made to explain to a number of raiyats the value of seed selection and the right method of carrying it out. In the case of paddy, plants were selected depending on their ears, while in the case of jute the thickness, size and freedom from branching of the plants formed the basis of selection. During the present year the selected

seed has been sown in a corner of the field of which the rest has been sown with ordinary unselected seed. It is proposed to compare the yield of the area sown with the selected seed with that of an equivalent area of the same field sown with ordinary seed.

(*d*) *Conservation of cattledung.*—It is well known that cowdung loses much of its value by being left exposed to sun and rain. It is therefore proposed to teach the raiyat how to take proper care of the manure by keeping it in pits covered over with a thatch. But people generally do not see the value of these recommendations yet and make various excuses for not digging the pit and not putting up the thatch. I am in correspondence with several Municipalities, in order to induce them to store part of their cowdung according to our system and show the difference in the raiyats' own fields between the dung thus conserved and that treated in the ordinary way.

The work, as has already been mentioned, is fast expanding, and I find it impossible to cope with it properly with only five demonstrators at my disposal.

Ufra disease is under investigation and land has been selected at Govindapur for the Economic Botanist, who is trying to find out resistent varieties of paddy. Land has also been selected at Anandasar and Borkamto for Dr. Butler's experiments. No other serious crop-pests were reported during the year.

The demonstration work in future might well be conducted where there are co-operative credit societies. These societies might buy the manures and implements which are shown to them as valuable and useful among their members.

DWIJA DAS DUTTA,

Agricultural Supervisor.

APPENDIX I.

Bonemeal demonstrations.

SUBDIVISION BRAHMANBERIA.

Tippera.

Name.	Plots.	Yield per acre.	Difference per acre.	Profit or loss per acre.
		Mds. srs.	Mds. srs.	Rs. As.
Kailash Misti	Manured ...	30 15	12 15	28 0 profit.
	Unmanured ...	18 0		
Debendra Chandra Datta ...	Manured ...	27 0	7 0	12 0 ,,
	Unmanured ...	20 0		
Krishna Kumar Sen ...	Manured ...	37 5	6 30	11 4 ,,
	Unmanured ...	30 15		
Kali Kumar Sen	Manured ...	29 25	.....	9 0 loss.
	Unmanured ...	29 25		
Abinash Chandra Datta ...	Manured ...	23 25	5 5	6 5 profit.
	Unmanured ...	18 20		
Jal Lal Mohim ...	Manured ...	28 25	8 15	9 2 ,,
	Unmanured ...	20 10		
Eidries Meah	Manured ...	33 30	4 30	5 4 ,,
	Unmanured ...	29 0		
Sreedhan Namasudra ...	Manured ...	26 5	5 35	8 10 ,,
	Unmanured ...	20 10		
Autul Chandra Duphi ...	Manured ...	15 30	.....	9 0 loss.
	Unmanured ...	15 30		
Monhor Kha	Manured ...	30 15	5 25	7 14 ,,
	Unmanured ...	24 30		
Bepari	Manured ...	23 25	3 15	1 2 ,,
	Unmanured ...	20 10		
Annanda Chandra Das ...	Manured ...	16 10	.....	9 0 ,,
	Unmanured ...	16 10		

N. B.—Manure at Rs. 3 and paddy at Rs. 3 per maund.

Noakhali.

Kshirod Chandra Mazumdar...	Manured ...	21 5	2 10	2 4 loss. Soil is slightly alkaline.
	Unmanured ...	18 35		
Ambica Charan De ...	Manured ...	15 5	6 5	9 6 profit.
	Unmanured ...	9 0		
Kula Chandra De ...	Manured ...	18 5	3 0	.....
	Unmanured ...	15 5		

Noakhali—concld.

Name.	Plots.	Yield per acre.	Difference per acre.	Profit or loss per acre.
		Mds. srs.	Mds. srs.	Rs. as.
Baikunta Chandra Mazumdar	Manured ...	19 25	7 15	13 2 profit.
	Unmanured ...	12 10		
Mehar Ali	Manured ...	15 5	9 5	18 0 „
	Unmanured ...	6 0		
Tarini Charan Sarkar ...	Manured ...	19 25	6 35	19 10 „
	Unmanured ...	12 30		
Naba Chandra Dhupi ...	Manured ...	15 5	3 5	6 6 „
	Unmanured ..	12 0		
Abhaya Charan Karmakar ...	Manured ...	21 35	4 35	5 8 „
	Unmanured ...	17 0		
Akhoy Kumar Sill ...	Manured ...	12 0	12 0	36 0 „
	Unmanured ...	.....	Was fed to the cattle as there was no crop in the check plot.	
Saradha Charan Bhumick ...	Manured ...	17 20	6 20	10 8 profit.
	Unmanured ...	11 0		
Jogesh Chandra Chakravarti	Manured ...	22 0	5 15	7 2 „
	Unmanured ...	16 25		
Sarajahan Haq	Manured ...	10 20	4 20	4 8 „
	Unmanured ...	6 0		

Chittagong.

Abdul Gani	Manured ...	36 0	6 0	9 0 profit.
	Unmanured ...	30 0		
Maulvi Kazimali Mia ..	Manured ...	32 10	0 30	6 12 loss.
	Unmanured ...	33 0		
Abdul Latip Munshi ...	Manured ...	22 20	7 20	13 8 profit.
	Unmanured ...	15 0		
Hamdu Mia	Manured ...	22 20	9 0	18 0 „
	Unmanured ...	13 20		
Nur Ali	Manured ...	34 20	6 0	9 0 „
	Unmanured ...	28 20		
Narayan Sing Sardhar ...	Manured ...	21 0	3 0	.....
	Unmanured ...	18 0		
Abdul Samad	Manured ...	24 0	.....	.....
	Unmanured ...	24 0		

Chittagong—concld.

Name.	Plots.	Yield per acre.	Difference per acre.	Profit or loss per acre.
		Mds. srs.	Mds. srs.	Rs. as.
Ramgali Mandal... ...	Crop destroyed by sudden flood on the 2nd October 1913.			
Kamini Kumar De ...				
Digambar De				
Umar Charan De ...				
Pran Krishna De ...				
Dinesh Chandra Chaudhuri ...				
Esab Ali	Manured ...	18 0	4 20	4 8 profit
	Unmanured ...	13 20		
Hamid Ali	Manured ...	18 0	6 30	11 0 ,,
	Unmanured ...	11 10		
Dula Mia	Manured ...	24 30	11 10	24 0 ,,
	Unmanured ...	13 20		

N.B.—Manure at Rs. 3 and paddy at Rs. 3 per maund.

Subdivision Comilla Sadar.

District Tippera.

		Mds Srs.	Mds. Srs.	Rs. as.
Abdul Ali	Manured ...	25 20	7 20	13 8 profit
	Unmanured ...	18 0		
Chaitan Dey	Manured ...	36 0	9 0	18 0 ,,
	Unmanured ...	27 0		
Baikuntha Dey... ...	Manured ...	25 10	6 20	10 8 ,,
	Unmanured ...	18 30		
Nur Ali	Manured ...	34 35	10 20	22 8 ,,
	Unmanured ...	24 15		
Ali Ahmed	Manured ...	29 0	5 0	6 0 ,,
	Unmanured ...	24 0		
Anu Miah	Manured ...	27 0	7 20	13 8 ,,
	Unmanured ...	19 20		
Sarat Ali	Manured ...	21 0	4 20	4 8 ,,
	Unmanured ...	16 20		
Bariruddi	Manured ...	27 20	7 20	13 8 ,,
	Unmanured ...	20 0		
Anur Ali	Manured ...	30 0	13 20	31 8 ,,
	Unmanured ...	16 20		

Tippera—continued.

Name.	Plots.	Yield per acre.	Difference per acre.	Profit or loss per acre.
		Mds. Srs.	Mds. Srs.	Rs. As.
Mahamad Hossain ...	Manured ...	22 0	14 0	33 8 profit.
	Unmanured ...	8 0		
Ajmad Ali	Manured ...	33 0	15 0	36 0 ,,
	Unmanured ...	18 0		
Ambar Ali	Manured ...	27 0	9 0	18 0 ,,
	Unmanured ...	18 0		

N. B.—Manure at Rs. 8 and paddy at Rs. 8 per maund.

Subdivision Chandpur.

District Tippera.

		Mds. Srs.	Mds. Srs.	Rs. As.
Ananda Roy	Manured ...	15 35	0 35	6 6 loss. Aus was grown in the same plot the difference between manured and unmanured was 10¾ maunds in aus.
	Unmanured ...	15 0		
Abdul Miah	Manured ...	15 5	.....	9 0 loss. (Soil was alkaline). There was no water in both the plots.
	Unmanured ...	15 5		
Nabakumar Datta ...	Manured ...	27 9	10 24	22 12 profit.
	Unmanured ...	16 25		
Sarat Datta	Manured ...	18 6	6 2	9 0 ,,
	Unmanured ...	12 4		
Kali Kamal Nag ...	Manured ...	15 0	3 0	.....
	Unmanured ...	12 0		
Sarada Chakrabarti ...	Manured ...	12 0	3 0	.....
	Unmanured ...	9 0		
Sashi Chakrabartti ...	Manured ...	12 0	0 12	8 4 loss.
	Unmanured ...	11 28		
Abdul Karim	Manured ...	Destroyed by flood.		
	Unmanured ...			
Hara Chandra Dhupi ...	Manured ...	13 25	2 13	2 0 loss.
	Unmanured ...	11 12		
Subal Dhupi	Manured ...	Destroyed by flood		
	Unmanured ...			

Tippera—concluded.

Name.	Plots.	Yield per acre.	Difference per acre.	Profit or loss per acre.
		Mds. Srs.	Mds. Srs.	Rs As
Chandra Mohan Takur ...	Manured ...	18 0	6 0	9 0 profit.
	Unmanured ...	12 0		
Harish Adhikari ...	Manured ...	12 0	1 0	6 0 ,,
	Unmanured ...	11 0		
Aminaddi		Destroyed by flood.		
Ibrahim Bepari ...	Manured ...	25 20	0 30	6 12 loss.
	Unmanured ...	24 30		
Baij Bepari	Manured ...	33 0	9 0	18 0 profit.
	Unmanured ...	24 0		

N. B.—Manure at Rs. 3 and paddy at Rs. 3 per maund.

APPENDIX II.

Potato Demonstration.

Subdivision Chandpur, district Tippera.

Name.	Village.	Area of the plot in yard.	Quantity of seed per acre.		Value of seed per acre.		Yield per acre.		Money value of return.		Profit or loss.	
			Mds.	Srs.	Rs.	A.	Mds.	Srs.	Rs.	A.	Rs.	A.
Hari Har Ghose ...	Mabar Badi ...	10 × 10	24	8	169	6	122	8	488	13	319	7 profit.
Bhubaneshwar Mazumdar	Ditto ...	15 × 15	16	5	112	14	32	13	129	6	16	8 „
Kali Krishna Mazumdar ...	Ditto ...	10 × 10	24	8	169	6	99	14	397	7	228	1 „
Chandpur Jail ...	Chandpur ...	6 × 6	33	24	235	4	58	27	234	12	0	8 loss.
Station-master Chandpur ...	Ditto ...	10 × 10	24	8	169	6	133	4	532	6	363	0 profit.
Nur Bakash Sheikh ...	Shudhan Baddi	15 × 15	16	5	112	14	60	20	242	0	129	2 „
Gafurali Hazi ...	Ditto ...	15 × 15	16	5	112	14	53	31	215	2	102	4 „
Ibrahim Pradhaina ...	Charmachua ...	10 × 10	24	8	169	6	96	32	387	3	217	13 „
Abdul Rafaman Haq ...	Ditto ...	10 × 10	24	8	169	6	96	32	387	3	217	13 „
Madbar Ali	Ditto ...	10 × 10	24	8	169	6	98	24	394	6	225	0 „
Azgar Haq	Ditto ...	10 × 10	24	8	169	6	96	32	387	3	217	13 „
Bakhar Ali	Bephari Moish, marichar.	10 × 10	24	8	169	6	96	32	387	3	217	13 „
Ibrahim Munshi ...	Ditto ...	10 × 10	24	8	169	6	96	32	387	3	217	13 „
Bakhar Ali Sarkar ...	Nachirarchar ...	10 × 10	24	8	169	6	96	14	387	3	217	13 „
Ali Maddi Sirkar ...	Borachar ...	10 × 10	24	8	169	6	99	14	397	6	228	0 „
Lal Chand Tafadar ...	Charkaina ...	10 × 10	24	8	169	6	96	32	387	3	217	13 „
Bhoriab Chandra Tafadar ...	Ditto ...	10 × 10	24	8	169	6	98	24	394	6	225	0 „

Subdivision Sadar, district Tippera.

			Mds.	Srs.	Rs.	A.	Mds.	Srs.	Rs.	A.	Rs.	A.
Akup Ali	Mamudpur ...	25 × 13	7	17	52	0	29	31	119	2	67	2 profit.
Mana Raddi	Ditto ...	16 × 10	7	22	52	14	15	8	60	13	7	15 „
Khirod Chandra Acharji ...	Paschimgao ...	15 × 5½	7	13	52	2	11	30	47	0	15	12 loss.
Nabab Bari	Ditto ...	15 × 5	8	2	56	6	14	21	58	2	1	12 profit.
Harimohan De ...	Ditto ...	14 × 6	3	24	25	2	11	21	46	2	21	0 „
Isad Mia	Ditto ...	$\frac{7}{2}$ × 6	7	21	52	10	...		...		...	
Akshay Basu	Ditto ...	13 × 6½	14	12	100	0	...		...		...	
Kayamaddin	Durgapur ...	33 × 24	10	9	71	10	101	0	404	0	332	6 profit.
Safar Ali	Magua ...	26 × 16	8	28	61	0	49	18	197	13	136	13 „
Basu	Badarpur ...	$\frac{12}{2}$ × $\frac{7}{2}$	8	27	60	14	13	5	52	2	8	12 loss
Hemendra Mohan Datta ...	Tulatali ...	21 × 13	8	34	62	0	15	12	61	4	0	12 „
Bipin Chakrabartti ...	Do. ...	30 × $\frac{13}{2}$	6	30	47	8	9	34	39	6	8	2 „
Rajani Kanta Datta ...	Do. ...	$\frac{7}{2}$ × $\frac{13}{2}$	5	20	38	8	22	3	88	5	49	13 profit.
Sree Krishna De ...	Khadupa ...	31 × 17	9	7	64	4	41	3	164	5	100	1 „

Subdivision Sadar district Tippera —concld.

Name.	Village.	Area of the plot in yard.	Quantity of seed per acre.	Value of seed per acre.	Yield per acre.	Money value of return.	Profit or loss..
			Mds. Srs.	Rs. A.	Mds. Srs.	Rs. A.	Rs. A.
Ali Maddis Bhuya ...	Badarpur ...	20 × 12	7 22	52 12	55 18	221 13	169 1 profit.
Autabali Miah ...	Chiara ...	15 × 11	7 13	51 3	54 26	218 9	167 6 „
Asrab Ali	Dhalua ...	$\frac{3}{2}$ × 6	12 8	85 2	122 9	488 14	403 12 „
Chandra Kanta Chakrabartti	Azira ...	21 × 8	8 25	60 6	57 24	230 6	170 0 „
Gagan Chandra De ...	Gamkot ...	15 × $\frac{1}{2}$	6 8	43 3	10 30	43 0	0 3 loss.
Koilash Chandra De ...	Ditto ...	16 × 6	6 12	44 2	31 2	126 0	81 14 profit.
Nazamaddi	Ditto ...	21 × 13	8 5	56 14	39 35	159 8	102 10 „
Lalmiah	Badarpur ...	$\frac{2}{2}$ × $\frac{1}{2}$	12 33	89 10	36 35	147 8	57 14 „
Alimaddi	Ditto ...	13 × $\frac{1}{2}$	12 16	86 12	69 33	279 5	192 9 „
Hashmali	.....	...	...	...	...	...	...

District Chittagong.

			Mds. Srs.	Rs. A.	Mds. Srs.	Rs. A.	Rs. A.
Jagendra Lal Barua ...	Pahartali ...	6 × 9	22 16	156 13	134 17	537 13	381 0 profit.
Annada Charan Barua ...	Ditto ...	$\frac{8}{3}$ × 8	22 27	158 14	106 20	426 8	267 10 „
Rai Mohan Mitra ...	Doublemoorings	$\frac{3}{3}$ × $\frac{1}{3}$	9 13	65 0	121 13	485 6	420 6 „
Sarat Chandra Mahazan ...	Patenga ...	10 × 12	21 6	148 0	25 0	100 0	48 0 loss.
Dakhina Ranjan Roy ...	Dhoom ...	$\frac{3}{2}$ × 9	3 33	26 12	32 10	129 0	102 4 profit.
Sayed Serajuddin ...	Gamalpur ...	9 × 7	5 30	40 4	40 13	161 6	121 2 „
Abdul Waduet ...	Ditto ...	10 × 7½	4 33	33 12	24 8	96 12	63 0 „
Sabman Ahmed ...	Shunapahar ...	14 × $\frac{2}{2}$	3 18	24 3	19 14	77 7	53 4 „
Sayadal Haq ...	Imampur ...	17 × $\frac{1}{2}$	3 31	26 6	22 34	91 7	65 1 „
Abdul Ali Haji ...	Mastaunagar ...	15 × 7	4 24	32 0	46 31	191 2	159 2 „
Callequer Rahaman ...	Ditto ...	12 × $\frac{1}{2}$	4 9	29 10	21 9	84 15	55 5 „
Afsaruddin ...	Shunapahar ..	10 × $\frac{1}{2}$	5 23	39 0	22 13	89 6	50 6 „
Shunapahar ...	Model farm ...	44 × 16	5 6	36 0	10 12	41 6	5 6 „
Muni Kanta Rouza ...	Fayerkhil ...	9 × 5	8 2	56 12	32 10	129 0	72 4 „

N.B.—Seed potatoes at Rs. 7 and the actual market value of potatoes at the time harvested Rs. 4.

Subdivision Brahmanberia.

			Mds. Srs.	Rs. A.	Mds. Srs.	Rs. A.	Rs. A.
Nil Kanta Das ...	Urshiura ...	9 × 6	22 16	156 12	224 10	897 0	740 4 profit.
Kali Kumar Sen ...	Ditto ...	7 × 5	22 14	156 8	72 24	290 6	133 14 „
Surendra Kishor Datta ...	Gutawea ...	7 × 5½	25 5	175 14	110 10	441 0	265 2 „
Dehendra Nath Datta ...	Ram Rail ...	14 × 12	12 4	84 12	29 38	119 12	35 0 „
Kamini Kumar Datta ...	Dharkar ...	14 × 12	12 3	84 9	56 0	224 0	139 7 „
Beni Madhab Naha ...	Sreeghar ...	10 × 5	73 0	511 0	145 8	580 13	69 13 „

N.B.—Seed potatoes at Rs. 7 and the actual market value of potatoes at the time harvested Rs. 4.

District Noakhali.

Name.	Village.	Area of the plot in yard.	Quantity of seed per acre.	Value of seed per acre.	Yield per acre.	Money value of return.	Profit or loss.
			Mds. s.	Rs. A.	Mds. s.	Rs. A.	Rs. A.
Ambica Charan Muktear ...	Gupta Anka ...	22 × 18	20 14	143 0	204 34	819 6	676 6 profit.
Ram Kumar De ...	Ditto ...	15½ × 6	19 20	136 8	111 28	446 12	310 4 ,,
Devendra Nath Chakrabarty	Machdi ...	16 × 5½	19 37	139 4	41 10	156 0	16 12 ,,
Tarini Charan Sirkar ...	Joy Krishnapur	10 × 6	20 6	141 0	86 21	346 2	205 2 ,,
Naba Chandra Dhupi ...	Hari Narayanpur	10 × 10	20 6	141 0	91 20	366 0	225 0 ,,

N.B.—Seed potatoes at Rs. 7 and the actual market value of potatoes at the time harvested Rs. 4.

RESULTS OBTAINED FROM THE SYSTEM OF PLANT-TO-PLANT SELECTION OF SEED, 1913-14.

DISTRICT—TIPPERA.

Subdivision—Brahmanberia. Crop—Aus paddy.

NAME.	Village.	Length and breadth of the plot.	Quantity selected and sown.	Yield of the plot.	Yield of the check plot.	Yield per acre of the plot.	Yield per acre of the check plot.	Difference.
1	2	3	4	5	6	7	8	9
		Yds.	S. CH.	S. CH.	S. CH.	MDS. S.	MDS. S.	MDS. S
Nabakishore Nath	Urshuira ...	7 × 1½	0 4	1 4	1 0	19 26	15 12	4 14
Bharat Chandra De	Do. ...	2½ × 6	0 4	1 2	1 0	13 31	11 1	2 30
Atul Dhupi	Do. ...	7½ × 6½	0 6	3 8	3 0	32 20	10 13	2 7
Harish Chandra De	Konduai ...	9 × 8½	0 6	2 12	3 4	8 2	6 5	1 37
Haran Chandra Mali ...	Do. ...	5 × 6	0 2	2 4	1 12	11 31	8 25	3 6
Girish Chandra Sil	Do. ...	2½ × 6	0 2	2 4	1 0	23 31	11 1	2 30
Mahim Dhupi	Do. ...	7 × 3½	0 6	2 20	2 0	20 3	15 10	4 23
Kailash Chandra Dhupi ...	Do. ...	3 × 24	0 6	4 0	3 0	15 25	12 13	3 12
Bhoirab Chandra De ...	Do. ...	6 × 5½	0 4	3 0	2 8	12 12	10 22	1 30
Bipin Chandra Dhupi ...	Do. ...	4 × 6½	0 4	2 8	2 4	17 25	16 10	1 15
Gakul Chandra Nama ...	Hapania ...	10 × 6	0 6	5 8	4 8	18 33	15 12	3 21
Mahim Chandra Nama ...	Do. ...	7½ × 5	0 6	4 8	3 4	16 22	12 13	4 9
Purna Chandra Nama ...	Do. ...	10 × 4	0 6	4 0	3 0	15 25	12 13	3 12
Sib Ram Nama	Do. ...	10 × 4	0 6	4 0	3 0	14 12	12 22	1 30
Safaruddin	Rohimpur ...	7 × 80	0 4	2 8	2 0	11 31	8 25	3 6
Harkishore Nama	Satpara ...	10 × 4	0 4	4 8	4 0	19 26	15 30	3 36
Abdul Hamid	Kharampur ...	9 × 10	0 6	5 0	4 0	15 25	12 13	3 12
Kartik Kapali	Durgapur ...	7½ × 10	0 2	2 8	2 0	17 25	16 10	1 15

Subdivision—Chandpur. Seed selection—Aus paddy.

		Yds.	S. CH.	S. CH.	S. CH.	MDS. S.	MDS. S.	MDS. S.
Sarada Charan Chakravarty	Upalata ...	10 × 5	0 8	15 0	15 0	36 12	36 12	...
Naba Kumar Dutta	Sahapur ...	5 × 2½	0 4	7 0	6 12	67 30	65 12	2 18
Kali Kumar Nag	Upalata ...	10 × 5	0 8	10 0	10 0	28 8	28 8	...
Sarat Chandra Dutta ...	Naura ...	5 × 2½	0 4	6 8	6 6	62 36	61 28	1 28
Ram Kumar Roy	Sahapur ...	5 × 2½	0 4	8 0	8 1	76 37	77 34	0 31
Safar Ali	Do. ...	5 × 2½	0 4	6 0	6 0	57 35	57 35	...
Ahsanuddin Munshi ...	Suapara ...	5 × 2½	0 4	6 8	6 7	62 36	62 12	0 24
Umacharan Acherjee ...	Shahapur ...	5 × 2½	0 4	6 8	6 8	62 36	62 36	...
Jagat Chandra Acherjee ...	Do. ...	5 × 2½	0 4	6 0	4 0	57 35	58 0	...
Kshirod Mohan Ghose ...	Do. ...	5 × 2½	0 4	6 4	5 0	58 0	48 16	9 24
Harish Chandra Das ...	Durgapur ...	5 × 2½	0 4	5 0	5 0	48 16	48 16	...
Satish Chandra Chakravarty.	Barunia ...	5 × 2½	0 4	6 0	3 0	57 35	29 1	28 34
Abdul Majid Mia	Bijoypur ...	5 × 2½	0 4	5 0	5 1	48 16	57 32	9 16
Hamid Ali	Kajirkak ...	5 × 2½	0 4	6 2	6 0	59 3	57 35	1 8
Jogendra Tagore	Upalata ...	5 × 2½	0 4	6 4	6 2	58 0	56 32	1 0
Jagadish Chandra Das ...	Do. ...	5 × 2½	0 4	4 8	3 4	43 10	38 18	4 32
Agni Kumar Das	Ghughusan ...	5 × 2½	0 4	4 12	4 0	45 25	38 18	7 7
Achati Mia	Shahapur ...	5 × 2½	0 4	6 4	5 0	58 0	48 16	9 24

RESULTS OBTAINED FROM THE SYSTEM OF PLANT-TO-PLANT SELECTION OF SEED, 1913-14.

DISTRICT CHITTAGONG.

Crop—Aus paddy.

NAME.	Village.	Length and breadth of the plot.	Quantity selected and sown.	Yield of the plot.	Yield of the check plot.	Yield per acre of the plot.	Yield per acre of the check plot.	Difference in favour of selected seeds.
1	2	3	4	5	6	7	8	9
		Yds.	S. ch.	Mds. s.	Mds. s.	Mds. s.	Mds. s.	Mds. s.
Nimai Charan Do ...	Bagoan ...	12½ × 9½	1 0	0 38	0 33	38 28	33 30	4 38
Minnat Ali	Do. ...	8½ × 9½	0 12	0 21	0 18	29 10	26 30	2 20
Ansar Ali	Do. ...	11 × 8½	0 14	0 31	0 26	35 17	30 2	5 15
Amir Ali	Do. ...	12½ × 10	1 0	0 39	0 35	35 27	33 27	1 30
Akhil Chandra Do ...	Do. ...	20 × 12½	2 0	1 28	1 16	32 36	27 4	5 32
Rajani Kanta Do ...	Do. ...	10 × 7½	0 12	0 20	0 18	32 10	29 33	2 17
Maulvi Kazimali Mia ...	Bakalia ...	40 × 45	10 0	10 5	9 20	27 16	25 21	1 35
Nayamat Ali	Do. ...	35 × 30	8 0	8 25	7 35	30 30	26 12	3 18
Tunya	Do. ...	20 × 22½	4 0	3 0	3 20	35 10	28 5	4 5
Anwar Ali	Do. ...	37½ × 20	10 0	8 5	7 22	33 28	30 5	3 18
Abdul Gani	Lamarbazar	22 × 23	5 0	3 5	2 25	29 30	27 6	2 30

PROGRAMME OF DEMONSTRATION WORK IN BENGAL.

Presidency Division.

1. Seed selection on paddy by water test at seed time.
2. Bonemeal on paddy—1 maund per bigha.
3. Green manuring *dhaincha* on paddy.
4. Rotation of jute with *aman* paddy.
5. Ditto potatoes.
6. Introduction of Italian potatoes.
7. Manuring potatoes—7 maunds castor-cake per bigha.
8. Introduction of thick canes from Burdwan, Dacca, Rajshahi and Rangpur.
9. Planting canes on ridge and furrow system.
10. Manuring, 60 maunds cowdung and 3 maunds castor-cake per bigha—one-third cake at planting time, one-third cake ridging, and one-third cake in rains.
11. Manuring of jute—40 maunds cowdung per bigha.
12. Ditto —3 maunds castor-cake ditto.
13. Introduction of iron *dons* for irrigation.
14. Ditto chain pumps ditto.
15. Ditto Meston plough.
16. Ditto Planet Junior hand-hoe.
17. Ditto cane mill and boiling pans.
18. Conservation of cattle-dung.
19. Distribution of *badshabhog* and *dadkhani* paddy seed as fine-grained varieties.
20. Seed selection for paddy.
21. Ditto for jute.

Burdwan Division.

1. Seed selection on paddy by water test at seed time.
2. Bonemeal on paddy—1 maund per bigha.
3. Green manuring *dhaincha* on paddy.
4. Rotation of jute with *aman* paddy.
5. Ditto potatoes.
6. Introduction of Italian potatoes.
7. Manuring potatoes—7 maunds castor-cake per bigha.
8. Introduction of thick canes from Burdwan, Dacca, Rajshahi and Rangpur.
9. Planting canes on ridge and furrow system.
10. Manuring, 60 maunds cowdung and 3 maunds castor-cake per bigha—one-third cake at planting time, one-third cake ridging, and one-third cake in rains.
11. Manuring of jute—40 maunds cowdung per bigha.
12. Ditto —3 maunds castor-cake ditto.
13. Introduction of iron *dons* for irrigation.
14. Ditto chain pumps ditto.
15. Ditto Meston plough.
16. Ditto Planet Junior hand-hoe.
17. Ditto cane mill and boiling pans.
18. Conservation of cattledung.
19. Distribution of *badshabhog* and *dadkhani* paddy seed as fine-grained varieties.
20. Seed selection for paddy.
21. Ditto for jute.

Dacca Division.

1. Effect of bonemeal—
   (*a*) on jute and winter paddy;
   (*b*) on *aus* and winter paddy.
2. Effect of cowdung conserved by demonstration last year on jute.
3. Introduction of Darjeeling potatoes in new areas.
4. Trial of last year's selected seeds on separate plots.
5. Selection of jute and winter paddy seeds.
6. Demonstration of Meston plough and Planet Junior hand-hoe.
7. Conservation of cowdung.
8. Introduction of good varieties of sugarcane from Dacca Farm.
9. Effect of bonemeal and lime on red lands (for jute).
10. Green manuring of jute with sunn-hemp.

Chittagong Division.

—*Manure*—

(1) Effect of bonemeal on jute and winter paddy.
(2) Ditto and cowdung (heavy dressing) on jute followed by winter paddy.

(3) Effect of bonemeal on *aus* followed by *aman*.
(4) Do. of green manuring on winter paddy.
(5) Do. of cowdung on jute followed by potatoes.
(6) Bonemeal on *aus* followed by potatoes.
(7) Effect of liming on acid soils.
(8) Do. of cowdung conserved according to our method *versus* cowdung.
(9) Conservation of cowdung, one under each demonstrator.

II.—*Improved seeds*—

(1) Trial of last year's selected seeds, and selection of seeds in new places.
(2) Selection of jute and *aman* paddy seeds.

III.—*Method of cultivation*—

Demonstration of Meston plough and Planet Junior hand-hoe.

IV.—*Varieties of crops*—

(1) Introduction of Darjeeling potatoes in new areas.
(2) Ditto superior sugarcane varieties from Dacca in Mirsarai, Comilla, etc.

RAJSHAHI DIVISION.

1. Effect of bonemeal on paddy.
2. Introduction of improved sugarcane.
3. Green manuring paddy with *dhaincha*.
4. Mass selection of jute seed.
5. Ditto winter paddy seed.
6. Conservation of cowdung.
7. Introduction of potatoes in new area.
8. Green manuring of potatoes with cowpeas.
9. Meston plough and hand-hoe.
10. Liming on acid soils.

RANGPUR DISTRICT.

1. Distribution of improved paddy seed.
2. Introduction of improved sugarcane.
3. Effect of bonemeal on paddy.
4. Ditto on jute and paddy.
5. Ditto on paddy and mustard.
6. Conservation of cattledung.
7. Use of Meston plough.
8. Green manuring with cow-pea for tobacco.
9. Ditto sunn-hemp for jute.
10. Ditto cow-pea for potato.
11. Jute to be followed by winter paddy.
12. Growing of winter paddy after *aus*.
13. Jawar to be grown for fodder.
14. Demonstrating the use of chaff-cutter.
15. Ditto ditto hand-hoe.
16. Distribution of selected jute seed.
17. Green manuring with *dhaincha* on winter paddy.

REPORT OF THE AGRICULTURAL SUPERVISOR, DACCA DIVISION, ON SEED RATES.

DACCA.

Names of crops grown.	Quantity of seed rates per acre.			REMARKS.
	Mds.	Srs.	Ch.	
Paddy, Aman and Aus ...	0	36 -45	0	
Shail and Rowa ...	0	15 -23	0	
Boro	0	18 -23	0	
Jute	0	3 - 7	0	
Peas	0	15 -30	0	
Gram	0	15 -24	0	
Moong	0	6 -12	0	
Musur	0	12 -15	0	
Keshari	0	9 -18	0	
Arahar	0	15 -18	0	
Muskalai	0	8 -15	0	
Wheat	0	30 -36	0	
Oats	0	45 -48	0	
Mustard	0	3 - 6	0	
Sesamum	0	3 - 6	0	
Karlea	0	2¼- 5	0	
Cucumber	0	¾- 1½	0	
Jawar	0	12 -15	0	
Brinjal	0	0	6	chittaks.
Tomato	0	0	6	ditto.
Chillies	0	0	12	ditto.
Onions	0	0	12-24	ditto.
Garlic	0	1	8	
Sweet Potato		.....		Creepers are buried in the furrows.
Potato	12 -15	0	0	
Kaon	0	1½- 6	0	
Chuma	0	12 -21	0	
Pumpkin and Gourd ...	0	1½- 6	0	
Maize	0	15 -21	0	
Ginger	3-4½	0	0	
Safflower	0	21 -24	0	
Coriander	0	18 -21	0	
Radish	0	3 - 4½	0	
Kalijira	0	9 -12	0	
Dhaincha	0	7½- 9	0	
Sun	0	15 -21	0	
Linseed	0	3 - 6	0	
Barley	0	30 -36	0	
Mathi	0	4½- 7½	0	
Radhuni	0	2¼- 4½	0	

FARIDPUR.

Aman paddy	1	5	0	Maunds of 80 pounds.
Aus paddy	1	5	0	
Mixed paddy	1	5	0	

FARIDPUR—*concluded.*

Names of crops grown.	Quantity of seed rates per acre. Mds.	Srs.	Ch.	REMARKS.
Jute	0	4½- 6	0	
Til	0	3 - 6	0	
Mati Kalai	0	15 -18	0	
Mug	0	9 -12	0	
Khesari	0	30 -36	0	
Peas	0	30 -36	0	
Gram	0	36 -45	0	
Mushari	0	6 - 9	0	
Dhania	0	24 -30	0	
Linseed	0	6	0	
Niger Seed	0	3 - 9	0	
Kalijira	0	18 -21	0	
Pats	0	45 -60	0	
Radish	0	3 - 6	0	
Mustard	0	3 - 6	0	
Onion (large)	0	4½	0	Transplanted 4½ seers shown in a seed-bed sufficient for one acre.
Chillies	0	0 12 -18		Transplanted.
Brinjal	0	0 12 -18		Ditto.

BAKARGANJ.

Aus paddy	0	30	0	(Broadcasted.)
Ditto	0	20	0	(Transplanted.)
Aman paddy	0	16	0	(Ditto.)
Boro „	0	35	0	
Khosari	0	13	0	
Kalai	0	19	0	
Mug	0	13	0	
Gram	0	19	0	
Peas or motor	0	13	0	
Masar	0	13	0	
Arhar	0	6	0	
Til (jinjally)	0	7	0	
Mustard	0	4	0	
Cocoanut	275 plants.			
Betel nuts	400 seedlings.			
Jute	5 seers.			
Mesta pat	4 „			
Sunhemp	30 „			
Tobacco	1 ounce.			
Betel leaf	3,000 cuttings.			
Chilli	1 seer.			
Garlic	30 seers.			
Onion	4 „			
Arum (kanchu)	20 maunds (buds).			
Sugarcane	12,000 cuttings.			
Pineapple	10,000 plants.			

MYMENSINGH.

Names of crops.	Quantity of seed rates per acre.	REMARKS.
Aus paddy	30 seers.	
Paddy winter	25 ,,	
Jute	4 to 6 seers.	
Sun hemp	1 maund.	
Sugarcane	10,000 cuttings.	
Mug	10 seers.	
Masur	25 ,,	
Mati kalai	6 ,,	
Motor	35 ,,	
Arhar	8 ,,	
Til	10 ,,	
Tobacco	1½ ounce.	
Chillis	1 seer.	
Onions	15 seers.	
Kanchu	15 maunds (buds).	
Potatoes	10 maunds.	
Radish	1 seer.	
Lal alu	3,000 cuttings.	

R. DAS GUPTA.

REPORT OF THE AGRICULTURAL SUPERVISOR, RAJSHAHI DIVISION, ON SEED RATES.

Rajshahi, Sadar.

Thana.	Jute.	Aus paddy.	Aman, broadcast.	Aman, transplanted.	Boro paddy.
	Srs.	Srs.	Srs.	Srs.	Srs.
Boalia	1	15	15	10	Nil.
Nahatta	1	15	15	10	10
Tanore	1	15	15	10	10
Bagmara	1	16	15	Nil	12
Godagari	1	14	15	9	Nil.
Rajapur	1½	16	16	10	Nil.
Charghat	1	16	15	12	Nil.
Patya	1	15	16	10	10
Durgapur	1	20	20	15	Nil.

Nattore.

	Srs.	Srs.	Srs.	Srs.	Srs.
Nattore	1½	12	12	15	Nil.
Lallpur	1½	10	10	...	...
Walia	1½	12	12	15	...
Singra	1	12	12	15	...
Nandiga	1	9	12	12	...
Baraigram... ...	1½	15	12	12	...
Bagatipara ...	1¾	8	15	15	10

Naogaon.

	Srs.	Srs.	Srs.	Srs.	
Naogaon	1	15	15	12—15	...
Badalgachi ...	1	15	15	15	...
Panchupur ...	1	15	15	15	...
Mahadevpur ...	1	15	15	12	...
Mandu	1	12	15	15	...

MALDA.

Thana.	Jute.	Aus, paddy.	Aman, broadcast.	Aman, trans-planted.	Boro paddy.
	Srs.	Srs.	Srs.	Srs.	Srs.
Maldah	1	15	12	15	10
Kaliachak ...	1½	15	Nil	Nil	10
Gazol	1½	14	12	15	8
Sibganj	1	15	Nil	Nil	12
Tulshihata ...	1½	11	12	15	12
Kharba	1¼	12	12	15	Nil
Manikchak ...	1	12—15	Nil	Nil	12
Bamongola ...	1	15	15	12	10
Gomastapur ...	1½	12	10	15	10
Ratua	1¼	14	10	Nil	Nil
Nawabganj ...	1¼	15	10	10	15
Habibpur ...	1¼	15	14	Nil	Nil
Engrajbazar ...	1	15	10	15	10

BOGRA.

	Srs.	Srs.	Srs.	Srs.	Srs.
Bogra	1	12	12—15	12	10
Sariakandi ...	1¼	10	12—15	15	Nil.
Dhunat	1¼	10	12—15	15	10
Shibganj	1¼	10	12—15	12	10
Khetlal	1½	12	12—15	12	12
Sherpur	1	11	12—15	12	10
Kahalu	1	12	12—15	10	10
Dhupchachia ...	1¼	10	12—15	15	10
Pachbibi	1	11	12—15	12	12
Adamdighi ...	1½	11	12—15	12	12

PABNA.

Seeds rate — { 1 bigha = 80 × 80 cubits. / 1 seer = 80 tolas.

Thana.	Jute.	Aus, paddy.	Aman, broadcast.	Aman, transplanted.	Boro paddy.
	Srs.	Srs.	Srs.	Srs.	Srs.
Pabna	1¼	12	8	10	8
Santhea	1¼	15	10	10	10
Surganagar ...	1¼	15	10	10	...
Mathura	1½	10	8	10	...
Faridpur	1	15	9	12	...
Sara	1½	12	10	10	...
Chatmahar ...	1½	12	10	12	...

SIRAJGANJ.

	Srs.	Srs.	Srs.	Srs.	Srs.
Sirajganja ...	1¼	12	10	12	...
Ullapara	1¼	12	10	12	8
Sahazedpur ...	1¼	12	8	12	8
Kazipur	1¼	15	8	12	..
Kumarkhand ...	1½	12	12	10	...
Tarash	1¼	15	9	10	...
Raiganj	1	15	8	11	8
Chaehati	1½	10	10	8	...
Beckuchi	1½	12	9	10	10

JALPAIGURI.

	Srs.	Srs.	Srs.	Srs.	
Jalpaiguri ...	1	10	10	12	...
Boda	1	10	10	12	...
Pachgarh	1	10	10	12	...
Debiganj	1	10	12	12	...
Rajganj	1¼	12	12	12	...
Tetulia	1	10	12	15	..
Patgram	1	10	10	10	...

JALPAIGURI—*concluded.*

Thana.	Jute.	Aus paddy.	Aman, broadcast.	Aman, transplanted.	Boro paddy.
	Srs.	Srs.	Srs.	Srs.	Srs.
Mainaguri	1½	12	10	10	...
Nagakota	1½	12	12	12	...
Damdia	1	10	10	12	...
Mantially	1	12	10	12	...
Dhupgari	1	10	15	10	...

ALIPORE.

	Srs.	Srs.	Srs.	Srs.	
Alipur	1½	10	10	12	...
Falakata	1¼	12	12	12	...
Kumarga	1½	12	12	12	...

DINAJPUR.

	Srs.	Srs.	Srs.	Srs.	
Dinajpur	1½	10	15	10	...
Chirrirbandar ...	1½	12	12	15	...
Hemtabad ...	1½	10	10	12	...
Kaliganj	1¼	10	10	12	...
Nawalaganj ...	1	10	10	12	...
Itahar	1	10	10	10	...
Bansihari	1¼	8	10	12	...
Parbatipur ...	1¼	10	12	12	...
Ghoraghat ...	1	12	12	13	...
Raiganj	1½	15	12	12	...

N. N. GUPTA,

REPORT OF THE AGRICULTURAL SUPERVISOR, RANGPUR, ON SEED RATES.

NAME OF CROP.	Seed rate per acre.		REMARKS.
Aus paddy ...	Coarse ...	25—30 seers	Sowing begins in March.
	Fine ...	18—21 „	
Winter paddy ...	Early transplanted ...	10—12 „	Transplanting begins in June.
	Late transplanted ...	15—20 „	
Jute	Early ...	3 „	Sowing begins in February.
	Late ...	5 „	
Mustard ...		3 „	
Pulses	Matikalai ...	6 „	Sowing begins in July.
	Khesari ...	9 „	Sown on top of transplanted paddy.
Potato ...		6—8 maunds	Only small tubers are usually used.
Wheat ...		10 seers.	
Tobacco ...	5,000—10,000 seedlings per acre are planted depending on the fertility of the soil and the variety of tobacco grown—the richer the soil and larger the plant the less is the number of seedlings used. It may be noted that the sowing begins very early in this district both in the kharif and rabi season. The seed rate, therefore, is usually smaller than in other Eastern Bengal districts.		

J. N. CHAKRABATTI.

REPORT OF THE AGRICULTURAL SUPERVISOR, CHITTAGONG DIVISION, ON SEED RATES.

District.	Subdivision.	Seed rate per acre in seers.					
		Jute.	Aus broadcasted.	Aman broadcasted.	Aman transplanted.	Boro transplanted.	Aus and aman mixed.
Tippera	Brahmanbaria	4 —5	39 —50	30—35	13—18	16—22	...*
	Nabinagar						
	Bancharampur	3 —5	32 —40	27—32			
	Nasirnagar						
	Kasba	5 —7	40 —55	32—40	18—25	...	...
	Kotwali	4 —6	37½—50	30—37½	25—30	...	...
	Chandigram						
	Laksham	5 —7	40 —55	35—40	16—22	25—30	...
	Chandura						
	Muradnagar						
	Homna	3½—4½	35 —40	30—35	12—15	15—18	...
	Dadkandi						
	Chandpur	4 —6	37½—50	30—40	25—30	...	*Aus* 30—40 *Aman* 15—25
	Hajiganj	5 —7					
	Matlab	...	...	...	...	...	...
Noakhali	Sudharam	3¾—6	30 —45	25 —35	22—30	...	*Aus* 30—40 *Aman* 15—12
	Begamganj	4 —6	37½—50	30—40	25—30	...	*Aus* 37—45 *Aman* 20—25
	Lakhmipur						
	Raipur						
	Feni	5 —7	46 —51	50—57	28—32	...	...
Chittagong	Chittagong	...	44 —57	...	28—32	...	...
	Sitakund						
	Hathazari						
	Satkania	...	35 —45	30—40	24—28	...	...
	Patiya						
	Cox's Bazar	...	32 —35	30—33	20—23	...	
	Ramao						

* See remarks below.

The rate of seedling is dependent on factors, of which the following are the most important, viz:—

(1) Moisture on the soil during sowing.
(2) Comparative fertility of the soil.
(3) Large or small grains in case of paddy, *i.e.*, heaviness or lightness of grain.
(4) The time of transplantation.
(5) The practice of transplanting one or more seedlings to the hole.

The seed rate becomes heavier with the infertility of the soil, want of moisture during sowing time, and the nature of the variety, and in the case of transplanted *aman* with lateness in transplantation and the number of seedlings planted per hole.

DWIJA DAS DUTTA.

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ANNUAL REPORTS

OF THE

EXPERT OFFICERS OF THE DEPARTMENT OF AGRICULTURE, BENGAL,

FOR THE YEAR ENDING

30TH JUNE 1915.

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ANNUAL REPORT OF THE 1st DEPUTY DIRECTOR OF AGRICULTURE, BENGAL, FOR THE YEAR ENDING 30th JUNE 1915.

I WAS in sole charge of the office until the middle of February 1915 when Kenneth McLean, Esq., the 2nd Deputy Director, came to Bengal and took over charge of the Dacca, Rajshahi and Chittagong Divisions. This relieved me of all farms except Kalimpong and other work in those divisions.

I was on duty throughout the year and with the exception of the month of December which I spent in visiting the farms of the Madras Presidency, my time was chiefly occupied in inspecting the various farms in the Province, in organising our exhibits at agricultural *melas*, in visiting demonstration work of the Department and Ufra work in Comilla and in managing the seedstore at Sibpur.

I was on tour during the year 204 days. Of this period, more than 50 per cent. was spent on the farms, while the remainder was spent in touring in every division and most districts of the Province. As will be seen below results were much affected at Chinsurah, during the period under review, owing to the abnormal weather conditions which prevailed. The rain flooded out the jute crop in May and June while drought from September onwards caused partial failure of the rice crop. At Burdwan, excellent work was done with thick cane. Over 100 maunds of *gur* per acre were obtained from White Tanna Sugarcane and a large number of cuttings were distributed to cultivators. At Kalimpong again an average outturn of nearly 30 maunds of maize grain per acre over 20 acres were obtained, and it is interesting to note that local cultivators are now beginning to follow our practice of applying heavy farm yard manure dressings. This year a little more of our selected seed was distributed to *bonâ fide* cultivators than last year, but the quantity was still too small to be able to say that local cultivators appreciated our efforts in this respect.

Many agricultural exhibitions were abandoned on account of the war. Some very useful *melas* were held, however, such as at Suri and Banjetia where cultivators came in by the thousand to compete with one another and to see the exhibits.

Others would be more successful if a few more energetic members were enrolled on the Committee and everything subordinated, for one or two days, to holding a *mela*.

Owing to fewer *melas* and more sets of Divisional Exhibits, our Department was better represented than in previous years and as Superintendents of Agriculture obtain more experience, the Department will become more active and better known throughout the districts.

Demonstration work is making some headway and when the two new Superintendents of Agriculture of the Presidency and Burdwan Divisions know their charges better and are able to keep continually month by month in contact with the work of each active member, we shall begin to obtain some very useful data.

We cannot possibly hope to keep continually in touch with active members until an agricultural officer is appointed to every district, and if reliable data are to be obtained it will only be by doing the work ourselves under constant superior supervision. There are several active members in every district who are willing to carry out something recommended by our Department, but they require to be shown what to do. It is not sufficient to pay one flying visit in a season to each member to give instructions. This is all that could be attempted in the past with the small staff at our command. The result has been unsatisfactory. We must continually control the demonstration from its very commencement to a successful conclusion if we ever wish to get at the great mass of cultivators.

A full programme was arranged and carried out for investigating the Ufra disease of paddy at Comilla; but owing to the scanty rainfall and lowness of the rivers very little Ufra was noted in 1914, so further investigation will have to be made.

The Sibpur seedstore continued to be the chief supply for seeds, manures and implements for the whole Province during the larger part of the year, but towards the end of the year each division was provided with a seedstore and the Sibpur seedstore has, therefore, been abolished. For the Burdwan Division it was found more convenient to have a seedstore near the Howrah station. Each seedstore is in charge of the respective Divisional Superintendent of Agriculture.

Agricultural Stations :—

1. *Chinsurah.*
2. *Kalimpong.*
3. *Burdwan.*

1. Chinsurah Agricultural Station.

There are few useful data to record as the result of the past year's work on this station. The Superintendent was new to this place in the previous year, so his want of experience of local conditions found him quite unprepared for heavy downfalls of rain in May which, followed by a very wet June, flooded out the jute crop. These heavy early rains also flooded out most of his paddy seed beds which delayed transplanting on the larger area of the farm until late in August with the result that as a drought set in from August onwards most of the paddy crop partially failed. Small areas were transplanted in July and yielded outturns of 25 to 27 maunds per acre on acre blocks, but the average outturn for 102 acres was only 10 maunds per acre which compares very unfavourably with 27 maunds per acre from 91 acres in the previous year. The delay of transplanting was fatal and always will be fatal. I find, apart from irrigation, nothing can compensate for delay in the transplanting of paddy later than July in the Burdwan Division. Other things being equal, the outturn is always less the later the paddy is transplanted after the middle of July. Superintendent's figures show, that after deducing a total failure of 13½ acres, jute worked out at 6¼ maunds of fibre per acre and less than 1 maund of se ed per acre. These results are bad. Neither jute nor paddy paid for themselv es in 1914 on this farm.

All other crops are subsidiary to the above two and, with the exception of gram and potatoes, gave very poor results.

Generally speaking, except for a very limited period on this farm, when the river Hooghly is in flood and when farm crops require as much flood water as they can get, drainage is a simple matter, but irrigation is a more complicated undertaking especially on a large area. Having found out that for want of one or two judicious irrigations we have had to put up with partial failures of both the jute and paddy crops, we decided to try an oil engine and pump for irrigation purposes. To this end we took over an old machine lying in the Department and instal led it near one of the tanks on the Chinsurah farm. Results up to date show that it will not do to allow any of the present farm staff to touch the engine and pump, and that we must have a trained mechanic in charge. There is not the slightest doubt that in adverse years if we can give one or two timely irrigations we can guarantee bumper crops of paddy and jute. It remains to be proved whether the expense of an oil engine and pump for giving one or two irrigations in abnormal years will be repaid by the extra yield obtained. There are other points also to be remembered, viz., the certainty of a return and the ability to grow garden crops, such as vegetables all through the winter months after the jute and paddy crops have been harvested. This branch of work—irrigation—tends to be the most useful and interesting item of investigation in the Burdwan Division.

The financial results for this farm during the year 1914-15 compare very unfavourably with those of previous years :—

April—March 1914-15.

Receipt.	Rs.	A.	P.	Expenditure.	Rs.	A.	P.
Sale-proceeds ...	1,158	14	0	Farm expenditure	9,888	1	4
Stock in hand on 1st April 1915 (since sold).	3,020	8	9	Supervision ...	3,686	14	9
				Apprentices ...	596	8	0
				Capital expenditure	388	0	0
Total ...	4,179	6	9	Total ...	14,559	8	1

This compared with receipts of Rs. 9,293-1-1 and expenditure of Rs. 10,465-8 in the previous year.

Ordinary farm expenditure has gone up over Rs. 2,300, while supervision has also increased by over Rs. 1,000.

Babu Chuni Lal Mustafi asks me to publish verbatim his report of the working of the year and I do so to record the year's working.

F. SMITH,

Deputy Director of Agricluture, Bengal.

ANNUAL REPORT OF THE FARM SUPERINTENDENT OF THE CHINSURAH AGRICULTURAL STATION FOR THE YEAR ENDING 30TH JUNE 1915.

1. *Introduction.*—This farm of 210 acres, the soil of which is typical of the Hooghly District of the Burdwan Division, is well suited to jute and winter paddy in years of normal rainfall. In addition to experiments on these two crops, a large area has now been allotted for demonstration of methods already declared to be superior and for production of pure seeds of jute and paddy varieties, also sugarcane cuttings, for distribution in the Division and the Province. Pure-line cultures of jute and paddy varieties have also recently been taken up under the guidance of the Fibre Expert and the Economic Botanist, Bengal, and it is hoped that the farm will be in a position before long to develop and supply seeds, whose superiority over all local seeds of the respective races will be guaranteed.

The water-storage and drainage scheme of the farm requires serious attention as experience shows that jute and paddy seed-bed areas cannot be drained if there are abnormal rains in May and June, as are occurring in recent years, and that the storage under existing conditions is too scanty to allow of anything like irrigation to paddy, not to speak of rabi crops, potato or sugarcane that come on later in the year. The very important sugarcane experiment—system of growing, Java v. Country—started towards the close of the year suffered very badly for absolute want of water, and the crop had to be left to its fate. A ring well was hurriedly sunk on the centre of the farm to provide drinking water for men and cattle while out at work there. A scheme for combined water-storage and drainage will shortly be submitted for consideration and necessary action.

The year under report was altogether unfavourable to agricultural operations on the farm under existing irrigation and drainage conditions. There had been no rainfall at all in March 1914, and this very badly affected the preparation of land. Ploughing operations started late in April, and so the sowing of jute and paddy seed-beds were bound to be late, resulting in the complete destruction thereof through abnormal rains in May of 12·38 inches against normal 5·85 inches. Thus the jute crop was doomed in May, and the secondary paddy against seed-beds sown in June had to fight through 19·5 inches of rains in July against normal 11·28 inches. The paddy seedlings that survived were very weak and late and transplanting started slowly in the third week of July. The rainfall throughout August—October was considerably deficient—18·48 inches against normal 24·13 inches—and the result was the stunting up of the paddy crop altogether.

2. *Situation and brief history.*—The farm is situated to the west of the East Indian Railway line between the Chinsurah and Hooghly stations. It is 38 inches above sea-level. The station was opened in 1908 and is representative of the Hoogly District.

3. *Irrigation.*—The farm has to depend almost entirely on rainfall. The tanks, *jhils* and channels have all silted up injuriously and no storage can now be secured for October—May irrigations. It is only the want of water on the area that keeps back cultivation in due season, and irrigation of a crop when needed. This question is the essential factor in the success of all agricultural institutions A definite scheme, with approximate cost, will shortly be submitted.

No experiment with water lifts could be conducted during the year, for want of water on the farm. The oil-engine pump set up in November 1914 did not work successfully, always tending to get out of order.

4. *Area.*—The area is 210 acres, of which about 180 acres are under actual cultivation, the remainder being occupied by the steading, roads, channels, tanks and *jhils*.

5. *Soil.*—The soil is mostly a clay loam and is representative of the Gangetic alluvium on the west side of the Hooghly. The soil is fertile and capable of growing good crops.

6. *Meteorology.*—The rainfall was nearly 10·5 inches above normal, being about 15 inches in excess in May and July. This was fatal to jute and paddy seed-beds. The deficiency of 6·31 inches in August—November badly told on the paddy crop transplanted late through the first sown seed-beds being destroyed by the early excess rains. The following table shows the average

normal rainfall at Sadar, 3 miles off, with the actual rainfall and number of rainy days recorded on the farm during the year under report:—

Month.	Average normal rainfall at Sadar.	Actuals on the Farm—		Excess or deficiency.	
		Rainfall.	Number of rainy days.	Plus.	Minus.
1914.	Inches.	Inches.			Inches.
April ...	2·46	3·43	7	·97	...
May ...	5·85	12·38	9	6·53	...
June ...	10·56	7·62	9	...	2·94
July ...	11·28	19·50	24	8·22	...
August ...	11·64	9·87	17	...	1·77
September ...	8·40	7·59	13	...	·81
October ...	4·09	1·02	1	...	3·07
November ...	·66	*Nil*	*Nil*	...	·66
December ...	·19	1·90	2	1·71	...
1915.					
January ...	·38	·26	2	...	·12
February ...	1·20	·34	1	...	·86
March ...	1·58	4·73	10	3·15	...
Total ...	58·29	68·64	95	20·58	10·23

7. *Temperature.*—The table below shows the average monthly maximum and minimum temperatures in Fahrenheit, in the open and in the shade on this farm for the year—

Month.	Inside maximum.	Average minimum.	Outside maximum.	Average minimum.	Godown maximum.	Average minimum.
1914.						
April ...	89	78	98	74	112	74
May ...	88	80	96	79	109	78
June ...	89	81	99	81	107	79
July ...	87	80	92	81	100	80
August ...	88	81	93	81	96	79
September ...	87	80	95	80	98	71
October ...	86	76	98	75	100	65
November ...	89	69	101	65	94	53
December ...	73	62	84	60	89	50
1915.						
January ...	74	73	81	58	84	49
February ...	79	68	88	62	91	51
March ...	85	74	92	69	96	60

8. *Operations during the year.*—The total area under cultivation during the year was 152·56 acres, of which 83 acres were under experiment and 69·56 acres were under ordinary cultivation. The unusual and peculiar weather conditions in the year told heavily on the crops of jute and winter paddy lowering the outturns very miserably.

(a).—General crops grown.—The table below shows the area, actual out turn and yield per acre of crops grown in 1914-15—

Name of crop.	Area in acres.	Actual out-turn.	Yield per acre.	Remarks.
		Md. srs.	Md. srs.	
Aman paddy	101·85	1,014 7	10 0	The wholesale destruction of first sown seed-beds caused by the early abnormal rains led to late transplanting resulting in a six-anna crop through deficiency of rainfall from August to November.
Jute ...	40·81 (of which 13·41 failed altogether)	Fibre 121 30 Seed 25 6	6 10	Want of February—March rains kept back the breaking up of the land; sowing was late and the young plants waterlogged by the abnormal rains of July.
Dhaincha ...	1·6	...	...	Green manured to aman paddy.
Sunnhemp ...	1	Seed 1 28 Fibre 0 24	1 28 0 24	Destroyed through heavy rains.
Sugarcane ...	·2	*Gur* 0 29 4 Cuttings 3,600 0	Rs. a. p. 134 8 6	Too much of blanks through indented cuttings drying up in transit, lowered the outturn heavily.
			Md.srs.ch.	
Potato ...	·5	46 10	92 20 0	Bad germination, 60 per-cent. Wild pigs also ravaged the crop.
Khensari ...	3·2	5 0	1 22 8	The absence of late rains affected germination and growth as the fields were cracked dry.
Lentils ...	·95	0 15	0 15 12	Want of moisture since sowing time, led to failure.
Mustard ...	·7	1 23	2 10 0	Want of moisture since sowing time, badly affected the crop.
Gram ...	·5	5 26	11 12 0	Soil very suitable; germination was very low through want of moisture, or the outturn would have been better still.
Pea ...	1·25	2 35	2 12 0	Absence of moistures since sowing led to failure.

The following table shows the respective outturns of different varieties of winter rice under the same unfavourable conditions each had to pass through during the year:—

Paddy variety.	Area in acres.	Average outturn of grain per acre.
Nagra	45·41	13¾ maunds.
Dadkhani	12·20	2⅞
Banktulsi	15·84	2¼ maunds.
Badshabhog	13·55	10⅞
Samundrabali ...	3·10	12⅝
Hatishal	1	14½
Kataribhog	3·36	7⅞
Indursail	·68	14⅙
Jatakalma and Kartickshal*	2·96	15½
Lauphala†	3·75	10⅙

The statement below shows the highest outturns in the year obtained with Nagra on acre plots, unfavourable though the conditions had been all throughout its growing period.

Plot number.	Outturn of grain per acre.
	Md. s.
B ⅓	26 10
B 1/0	24 30
B ⅔	25 20
B 2/0	27 0

So, the superiority of Nagra—the local variety of aman paddy—as the stuff for ordinary cultivation is well proved, and it remains with us now to attain a further improvement of this particular race by a pure line culture of the seed secured from selected single plants. Work on this line is being started in 1915-16.

The following table records the respective outturns of different varieties of jute under the same adverse conditions:—

Variety.		Area in acres.	Average outturn per acre in maunds.
			Md. s.
Olitorius, Hooghly	Seed ...	3·90	0 35
	Desi fibre ...	11·65	3 25
Tosha	Seed ...	1·00	1 10
	Fibre ...	1·05	11 25
Capsularis Kakya, Bombai No. 7.	Seed ...	2·00	5 10
	Fibre ...	1·55	8 30
Deswal	Seed ...	1·05	3 0
	Fibre ...	·05	9 0
Dhaleswar ...	Seed ...	1·05	2 10
	Fibre ...	·05	11 0
Barapat ...	Seed ...	·05	5 0

B.—Experimental works on jute and aman paddy:—

(1) Jute—

(*i*) Based on figures obtained from ⅕ acre each in duplicate.

Manure per acre.	Total cost of cultivation per acre.	Outturn of fibre per acre.
	Rs. A. P.	Md. s. c.
Nil	69 9 6	4 17 8
Cowdung, 100 maunds ...	85 13 0	8 27 8
Castor cake, 10 maunds ...	97 3 6	13 25 0
Cowdung, 50 maunds ... / Super, 3 maunds ... ... / Saltpetre, 1 maund ...	109 11 0	8 5 0

(*ii*) One maund of sodium nitrate was applied to an acre of jute. The total cost of cultivation was Rs. 76, and the outturn of fibre 6 1/0 maunds. The experiment will be repeated next year and compared with a standard.

* Early high-land paddy—a good variety.
† Coarse low-land paddy.

(3) Varietal—on high-land—based on figures obtained from $\frac{1}{20}$ acre each being destroyed through water-logging. The outturns of fibre obtained per acre are noted as follows:—

	Md.	s.
Red Deshi Jute	21	10
„ Tosha	13	30
Kakya Bombai No. 7	26	20
„ Deswal	9	0
„ Dhaleswar	11	0

2. Aman paddy.

(*a*) Manurial.—The following table gives the manures applied with cost thereof and outturns of grain and straw obtained per acre under the same unfavourable conditions:—

Manure per acre.	Cost of manuring.	Outturn per acre.	
		Grain.	Straw.
	Rs. a. p.	Mds.	Mds.
1. Nil	...	$14\frac{1}{3}$	$25\frac{1}{2}$
2. Cowdung, 100 maunds	11 8 0	$16\frac{3}{4}$	$28\frac{1}{2}$
3. Cowdung, 100 „	20 14 0	$20\frac{7}{8}$	41
Bonemeal, 3 „			
4. Cowdung, 100 „	21 1 10	46	...
Ammon. sulph., 1 maund			
5. Cowdung, 100 maunds	32 3 0	$20\frac{1}{3}$	$29\frac{1}{4}$
Bonemeal, 3 „			
Ammon. Sulph., 1 maund			
6. Bonemeal, 3 maunds	24 15 0	$17\frac{1}{3}$	30
Ammonia sulphate 1 maund ...			
7. Bonemeal, 3 maunds	15 13 0	$16\frac{1}{2}$	$22\frac{3}{4}$
8. *Dhaincha, sown at 6 seers and green-manured.	9 6 0	$18\frac{1}{4}$	$33\frac{3}{4}$
9. Nitrolim, 1 maund	54 0 0	$16\frac{1}{3}$	$39\frac{1}{2}$
Super, 3 maunds			

* The dhaincha crop grew only 1′ high through heavy rains.

The superiority of dhaincha as green-manure to aman paddy is well established. The time of transplating, and favourable conditions for pollination are the two leading factors in rice cultivation. In other words, the following are the controlling conditions of a paddy crop, irrespective of the question of manuring:—

(1) Healthy seedlings raised early in the season.
(2) July transplanting with normal rainfall.
(3) Sufficient late rains in September—October at flowering and pollination periods.

The application of manures will certainly increase the yield and green-manuring with dhaincha or sunnhemp is the most economical manure generally recommended.

The table below shows the results of another series of manurial experiment:—

Manure per acre.	Cost of manuring.	Outturn per acre.	
		Grain.	Straw.
	Rs. A. P.	Mds.	K. P. G.
Nil	...	$17\frac{4}{5}$	3 11 0
Sodium nitrate, 1 maund ...	6 8 3	21	2 14 9
Calcium ditto ...	5 10 9	$22\frac{5}{8}$	2 13 14

The experiment will be repeated next year to obtain decisive results.

(*b*) Varietal.—The table below shows the average outturn per acre of 8 different varieties of winter paddy, the first 5 of which were being tried for 6 successive years.

Serial number.	Name of variety.	Average outturn per acre in maunds.											
		1909-10. Favourable rainfall.		1910-11. Transplanting very late.		1911-12. Scanty late rains.		1912-13. Favourable rainfall.		1913-14. Favourable rains, except at the late stage.		1914-15. Transplanting late and late rains deficient.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
1	Dadkhani ...	$19\frac{3}{4}$	24	$9\frac{5}{8}$	$16\frac{1}{4}$	$17\frac{3}{8}$	$25\frac{3}{4}$	$18\frac{1}{2}$	$23\frac{1}{16}$	$26\frac{1}{4}$	30	$7\frac{1}{2}$	$31\frac{1}{4}$
2	Badshabhog ...	$20\frac{1}{4}$	35	$12\frac{1}{4}$	$17\frac{1}{2}$	$20\frac{3}{4}$	37	$16\frac{1}{4}$	$26\frac{3}{4}$	$28\frac{1}{4}$	$47\frac{7}{8}$	11	$31\frac{1}{2}$
3	Banktulsi ...	$18\frac{1}{8}$	$29\frac{1}{2}$	$9\frac{1}{4}$	$15\frac{3}{8}$	$18\frac{1}{4}$	$31\frac{1}{4}$	$21\frac{3}{4}$	$31\frac{1}{2}$	$25\frac{3}{4}$	$43\frac{1}{4}$	$5\frac{1}{8}$	$35\frac{1}{16}$
4	Hatishal ...	19	$26\frac{3}{8}$	$10\frac{1}{4}$	$16\frac{1}{4}$	$12\frac{1}{2}$	36	22	$36\frac{3}{8}$	$23\frac{3}{4}$	$39\frac{1}{4}$	$14\frac{1}{2}$	$33\frac{3}{8}$
5	Nagra ...	$29\frac{1}{4}$	$32\frac{1}{8}$	9	$16\frac{1}{8}$	$19\frac{1}{8}$	$29\frac{3}{4}$	$21\frac{1}{2}$	$34\frac{3}{8}$	$31\frac{1}{4}$	$34\frac{1}{8}$	$11\frac{1}{4}$	$42\frac{3}{4}$
6	Indursail ...	...	...	...	...	...	...	...	...	...	...	$13\frac{1}{4}$	$37\frac{1}{16}$
7	Kataribhog ...	...	...	...	...	...	...	...	...	...	...	$8\frac{3}{4}$	31
8	Samudrabali ...	...	...	...	...	...	...	...	...	...	...	$11\frac{1}{2}$	$14\frac{5}{8}$

The unfavourable conditions during the year, however detrimental to attaining good crop results, have served an immense good in pointing out the particular paddy varieties that can withstand late transplanting as well as subsequent scanty rainfall.

Nagra, however prolific otherwise, seems to suffer under adverse conditions more than a few other varieties.

Banktulsi suffers worst.

Badshabhog and Samundrabali, two fine, scented and better-priced varieties, seem to bear the deficiency of late rains very fairly.

Hatishal has given good results in most of these years and seems to stand unfavourable conditions fully.

Indursail from selected seed of the Economic Botanist, seems to be a prolific variety and to stand rough conditions well.

(*c*).—*Methods of cultivation*—

1. Time of ploughing. To find out the difference in results from ploughing the land at the earliest opportunity after the last harvest and the same done in April—May. The results, as shewn below, appear to be in favour of the latter method. The experiment, however, will be repeated next year to obtain more decisive results.

Time of ploughing.	Total cost of cultivation per acre.	Outturn of grain per acre.
	Rs. A.	Mds. S. C.
Ploughing immediately after harvest	25 3	10 4 0
Ploughing in April—May ...	24 3	10 30 0

2. Kind of plough.—To compare the yields from the use of local and Hindustan ploughs for paddy cultivation. The figures seem to be in favour of the Hindustan plough. The experiment will be repeated.

Kind of plough.	Total cost of cultivation per acre.	Outturn of grain per acre.
	Rs. A. P.	Mds. S. C.
Local	26 12 6	7 5 0
Hindustan	27 6 3	7 26 10

3. Seedlings.—To test the difference in the use of varying numbers of seedlings per hole for transplanting at different periods. The figures are embodied in the table below.

Date of transplanting.	Number of seedlings used per hole.	Total cost per acre.	Outturn per acre in maunds.	
			Grain.	Straw.
		Rs. A.		
15th July ...	2	52 0	$12\frac{3}{8}$	$37\frac{3}{4}$
Ditto ...	4	57 3	14	$37\frac{1}{2}$
15th August ...	2	57 3	$10\frac{2}{3}$	51
Ditto ...	4	59 11	$9\frac{3}{4}$	$52\frac{3}{4}$

The deficient rainfall during August—October (4·65″ below normal) lowered the outturns badly, as in the cases of all crops during the year, but it is quite clear that two seedlings transplanted by the middle of July is always economic and best paying.

4. Spacing.—This was a compound experiment to find out economic spacing and number of seedlings to be transplanted per hole according to the time of transplantation. The results may be seen below.

Distance apart transplanted.	Number of seedlings used per hole.	Date of transplanting.	Total cost per acre.	Outturn per acre.	
				Grain.	Straw.
			Rs. A. P.	Mds. S.	K. P. G.
8 inches ...	2	15th July ..	35 2 6	24 20	3 1 0
12 „ ...	2	Ditto ...	38 6 0	26 20	3 0 0
8 „ ...	4	Ditto ...	36 6 3	26 10	3 1 5
12 „ ...	4	Ditto ...	36 14 6	26 12	3 1 16
8 „ ...	2	15th August ...	36 1 0	9 0	1 14 10
12 „ ...	2	Ditto ...	36 0 6	10 36	2 4 0
8 „ ...	4	Ditto ...	38 0 3	10 0	2 4 10
12 „ ...	4	Ditto ...	38 0 3	9 25	1 12 12

In the year under report with the rainfall from August—October 4·65″ below normal, 4 seedlings transplated 8″ apart on 15th July has given the best results. But it must always be borne in mind that all these details entirely depend on weather conditions, which are the controlling power by which the spacing and number of seedlings are to be fixed according to date of transplanting. The excess or deficiency of late rains will, however, play an important part in the final fate of the crop.

(d).—Conservation of cattle shed refuse.—The following table gives the results from the use of properly conserved cowdung as compared with that of raiyats' cowdung :—

Kind of cowdung.	Total cost per acre.	Outturn per acre.	
		Grain.	Total value.
	Rs. A. P.	Mds. S.	Rs. A. P.
Farm cowdung ...	34 2 6	8 25	37 7 2*
Raiyats' cowdung ...	38 13 6	8 10	36 2 9*

* Straw accounted for in valuation.

The deficient rainfall from August to October did not allow the the stuff to have its full play on the crop, or the superiority of properly conserved cowdung would have been more marked.

C.—Distribution of Seeds.—The following seeds were distributed from the farm store during the period under report:—

	Md.	sr.
Jute seed, Deswal	3	0
„ Tosha	0	32
„ Kakya Bombai No. 7	3	37
„ Barapat	0	6
„ Red Deshi	6	25
Paddy seed, Dadkhani	19	30
„ Badshabhog	18	35
„ Samudrabali	10	10
„ Nagra	2	0
„ Kataribhog	0	30
„ Banktulsi	0	5

An extensive area has now been set apart for production of sugarcane, and pure seeds of paddy and jute varieties for seed supply. Pure-line cultures of paddy and jute varieties have also been undertaken with a view to secure the best standard of each variety for gradual development and supply.

D.—Fowl Breeding.—This section of the farm started with 3 cocks and 9 hens of the black Langshan breed on the 1st April 1914. One cock and 5 hens were supplied to Bolpur (Birbhum) during the year under report. The figures of stock-taking on 31st March 1915 stood as—

Cocks	19
Hens	20
Pullets	2
Chickens	9

E.—Practical training of young men.—Four young men, with fair educational qualifications, received practical training on the farm during the year. All of them have been engaged as fieldmen demonstrators at the end of the year for work in rural areas outside. The sanctioned number of such apprentices on the farm is now 6, and it has been proposed to raise it to 20.

9. *Receipts and Expenditure—*

Receipts.	Rs.	A.	P.	Expenditure.	Rs.	A.	P.
Total remittance to treasury during the year	1,158	14	0	Capital expenditure (for laying out incomplete areas) ...	388	0	0
Amount adjusted on the stock transfer system ...	6	10	0	Wages of labourers and cost of all other contingencies ...	9,888	1	4
Bills receivable ...	331	12	3	Cost of management and supervision ...	3,686	14	9
Valuation of seed grains in stock for sale (based) on market rate ...	2,682	2	6	Cost for the training of young men (apprentices) ...	596	8	0
Total ...	4,179	6	9	Total ...	14,559	8	1

10. *Visitors.*—A few landed gentlemen and cultivators visited the farm during the year. All enquiries and instructions regarding agricultural matters were duly attended to. The rural public are cordially invited to see here things for themselves and to discuss the respective merits or otherwise of each. The Collector of the district paid a visit to the farm.

11. *Management and Inspection.*—Babu Chuni Lal Mustafi was the Superintendent in immediate charge of the farm during the year.

Babus Bisweswar Chatterjee, Harendra Chandra Bose and Birbar Chottoroy, the three Overseers, gave satisfaction in their works.

The Director of Agriculture, Bengal, inspected the station once; the Agricultural Chemist visited 5 or 6 times; the Economic Botanist and the Fibre Expert visited thrice; and the Deputy Director made frequent inspections during the year.

Appendix—Scheme of work for the year 1915-16.

CHUNI LAL MUSTAFI.
Superintendent.

APPENDIX

Experimental Scheme of the Chinsurah Agricultural Station, for 1915-16.

I.—Sugarcane ... ... 3·87 acres.

A.—Seed selection, propagation and production for supply of cuttings—planted indouble rows 18″ apart, with a space of 18″ between furrows 2′ wide—manured with cowdung 200 maunds + castor cake 8 maunds + super 3maunds per acre ... ... ·27 acre.

B.—Comparison of the Java system of growing canes with the country system, along with a comparison in outturn of the varieties planted, viz., Yellow Tanna, B208, B147, Sarethi, Samshara, Dacca Ganderi and Mauritius (from Haripal) on one-tenth acre each, in duplicate—manured with cowdung, 100 maunds + castor cake 8 maunds + ammonium sulphate 1½ maund + super 3 maunds per acre— ... ... 2·80 acres.

(1) Java system of growing ... ... 1·4 acre.
(2) Country ditto ... ... 1·4 ,,

C.—Variety experiment to test outturn and financial results—manured with cow-dung 100 maunds + castor cake 10 maunds Bonemeal 3 maunds per acre—Yellow Tanna, B208, B147, Samshara, Mauritius Tanna, Pauri, Mauritius(Haripal) and Khari on one-twentieth acre each, in duplicate—planted in double rows 18″ apart with a space of 18″ between furrows 2′ wide ... ·80 acre.

II.—Jute ... ... 24·13 acres.

A.—Seed selection for improvement of the type and for supply—manured with castor cake 5 maunds per acre— ... ... 8·93 acres.

1.—Olitorius—

(*a*) Red deshi ... ... 4·27 acres.
(*b*) Tosha ... ... 2·0 ,,

2.—Capsularis—

(*a*) Kakya Bombai No. 7 ... ... 1·07 ,,
(*b*) Deswal ... ... ·50 ,,
(*c*) Dhaleswar ... ... ·51 ,,
(*d*) Barapat ... ... ·58 ,,

B.—Seed selection, under the pure-line culture system, to attain perfection of the seed for future development—manured with cowdung 100 maunds peracre ... ... 1·20 acre.

C.—Comparison of the Kakya Bombai No. 7, Belgachia No. 4 and Red Deshi varieties—half the area for fibre and the other half for seed—manured with cowdung 60 maunds per acre— ... ·4 acres.

(1) Kakya Bombai No. 7 ... ... 1·6 acre.
(2) Red Deshi ... ... 1·6 ,,
(3) Belgachia No. 4 ... ... ·8 ,,

D.—Manures—on Red Deshi ... ... 5·20 acres.

Series 1.—To find out the stuff suitable for the district—on one-fifth acre each, in duplicate started in 1914-15 ... 1·6 acre.

(1) Unmanured.
(2) Cowdung 100 maunds per acre.
(3) Castor cake 10 maunds per acre.
(4) Cowdung 50 maunds + super 3 maunds + saltpetre 1 maund per acre.

Series 2.—To test if cowdung can be replaced by artificials—on one-fifth acre each, in duplicate ... ... 2 acres.

(1) Unmanured.
(2) Cowdung 100 maunds per acre.
(3) Muriate of potash 100 lbs. + super 100 lbs. + ammonium sulphate, 50 lbs. per acre.
(4) Ammonium sulphate 50 lbs. + super 100 lbs. per acre.
(5) Muriate of potash 100 lbs. per acre.

Series 3.—To test the utility of sodium and calcium nitrates—on one-fifth acre each, in duplicate ... ... 1·6 acres.

(1) Unmanured.
(2) Cowdung 80 maunds per acre.
(3) Sodium nitrate 1 maund per acre.
(4) Calcium nitrate 1 maund per acre.

E.—Method of Weeding—on Red Deshi—Comparison in financial results under thedifferent systems—on one-fifth acre each, in duplicate—manured with cowdung 100 maunds per acre— ... ... ·80 acre.

(1) Weeding by P. J. Hand Hoe—crop sown in lines 8′—9″ apart— ... ... ·4 acres.

(2) Weeding by "Nirani" as in practice—sowing usual ... ·4 acres.

F.—Suitability of Kakya Bombai for low-land—sowing early— ... 2 acres.

G.—Suitability of Tosha to be succeeded duly in season by aman paddy in the same year—manured with cowdung 100 maunds per acree 2 acres.

III.—*Paddy* ... ... 66·59

A.—Aus—C. P. fine, awned—manured with castor cake 3 maunds per acre. ... ... 5·00

Series 1.—Suitability for the soil and district—crop transplated 4·0

Series 2.—To test the difference under the system of—

(*a*) Sowing broadcast at 30 seers per acre ... ... ·5

(*b*) Crop transplanted—seed-bed rate 15 seers per acre of transplanting ... ... ·5

B.—Aman Paddy ... ... 61·59

1.—Suitability for high-land and comparison of varieties—on 2 acres each, manured with castor cake 3 maunds per acre ... 6·0

(*a*) Karticksal. (*b*) Jatakalma. (*c*) Jhingashal—

2.—Suitability of Kaminishal paddy for the soil, manured with super 3 maunds+saltpetre 30 seers per acre ... ... 2·0

3.—Seed selection for improvement of the type and for supply—on 2 acres each, manured with bonemeal 3 maunds, saltpetre 30 seers per acre ... ... 12·0

(*a*) Nagra, (*c*) Dadkhani, (*e*) Kataribhog,
(*b*) Badshabhog, (*d*) Samudrabali, (*f*) Hatishal.

4.—Seed selection, under the pure-line culture system, to attain perfection of the seed for gradual development—manured with cowdung 100 maunds+super 3 maunds per acre ... 2·0

5.—Varieties—comparison in outturn and finance on ½ acre each, in duplicate—manured with cowdung 50 maunds+bonemeal 3 maunds per acre ... ... 8·0

(*a*) Nagra
(*b*) Badshabhog
(*c*) Dadkhani
(*d*) Samudrabali
(*e*) Kataribhog
(*f*) Hatishal
(*g*) Indursail
(*h*) Sada Samba

6.—Manures—to find out a suitable application for the district ... 14·4

Series (*1*)—On one-fifth acre each, in triplicate—On Nagra (started in 1914-15) ... ... 5·4

(*a*) Unmanured.
(*b*) Cowdung 100 maunds per acre.
(*c*) „ 100 „ bonemeal 3 maunds per acre.
(*d*) „ 100 „ ammonium sulphate 1 maund per acre.
(*e*) „ 100 „ ammonium sulphate 1 maund+bonemeal 3 maunds per acre.
(*f*) Bonemeal 3 maunds, ammonium sulphate 1 maund per acre.
(*g*) „ 3 „ per acre.
(*h*) Green manured with Dhaincha sown at 8 seers per acre.
(*i*) Nitrolim 1 maund+Super 3 maunds per acre.

Series (2)—On one acre each—Nagra paddy ... ... 4·0

(*a*) Unmanured.
(*b*) Sodium nitrate 1 maund per acre.
(*c*) Calcium nitrate 1 maund per acre.
(*d*) Cowdung 100 maunds per acre.

Series (*3*)—On ½ acre each—Badshabhog paddy—(started in 1914-15) ... ... 1·0

(*a*) Unmanured—Dhaincha green manured to paddy.
(*b*) Dhaincha, manured with basic slag 336 lbs.; muriate of potash 168 lbs. per acre, green manured to paddy.

Series (*4*)—Comparison in outturn from the uses of properly conserved cowdung and heaped cowdung (started in 1914-15)—on 2 acres each—

Hatisal paddy... ... ... 4·0

(*a*) Farm cowdung 60 maunds per acre.
(*b*) Raiyats „ 60 „ „

.—Methods of cultivation (started in 1914-15) ... ... 17·19

Series (1)—Time of ploughing—on 2 acres—Kataribhog paddy—manured with bonemeal 3 maunds per acre to find out the difference in results from—

(*a*) Ploughing in January—February
(*b*) „ „ April—May } ... ... 4·0

Series (2)—Kind of plough—on one acre each—Samudrabali paddy—manured with bonemeal 3 maunds per acre—to find out the difference in results from ... ... 2·0

(*a*) Using country plough ...
(*b*) Using Hindustan „ ... ... } for paddy cultivation.

Series (3)—Seed rates for nursery—Nagra paddy—to compare financial results from sowing seed-beds at different rates—one-fifth acre each seed-bed—the transplanting area, green manured with Dhaincha, from each, and the results thereof, to be carefully recorded ... ... 11·19

Seed rates—

(*a*) 20 seers per bigha.
(*b*) 30 „ „
(*c*) 40 „ „
(*d*) 80 „ „

IV—*Chillies*—to test suitability and financial results—manured with cowdung 50 maunds per acre ashes ... ... 1·0

V.—*Potato*—Comparison of varieties—on one-tenth acre each, manured with cowdung 100 maunds—castor cake 10 maunds+super 3 maunds+saltpetre 30 seers per acre ... ... ·70

(1) Patna
(2) Naini Tal
(3) Darjeeling
(4) Italian
(5) Magnum bonum
(6) Farrukkabad
(7) Deshi

VI. *Fruit culture*—Trial of suitability and production for supply of grafts and suckers ... ... 3·71

A. Banana and Plantain ... ... 1·25.

(1) Local varieties—kanchkela, kanthali, martaman, champa and chini-champa.
(2) Rampal (Dacca) varieties—Sabri, Agniswar, Amritasagar, Dudhsagar and Kanaibansi.

B. Papaw—Ceylon and Bombay varieties—manured with bonemeal 3 mds. per acre —cowdung ash .. .. 1·0

C. Fruit trees and grafts—cowdung 150 mds. Bonemeal 5 mds. 1·46

(1) Mangoes (3) Peaches (5) Cocoa : palms
(2) Litchies (4) Limes (6) Areca : palms

D. Datepalm—for the sugar industry—along fencing

Total area under experiments 100·0 acres.

VII. *Demonstrations*—Of what have been definitely established—to be shewn to and impressed on interested visitors, and communicated throughout the district ... 44·08.

A. Aman paddy—Nagra ... ... 39·08

Series (1) Transplanting different numbers of seedlings per hole at varying periods—manured with bonemeal 3 mds., saltpetre 30 seers per acre ... ... 11·95

a. Two seedlings per hole—1st week of July ... 5 acres.
b. Four ditto ditto 1st Do. ... 5·0
c. Four ditto ditto 3rd Do. August ... 1·04
d. Eight ditto ditto 3rd Do. do. ... ·91

Series (2) Manurial ... ... 25·13

a. Unmanured ... ... 5·0
b. Cowdung, 80 mds. per acre ... ... 5·0
c. Bonemeal 3 mds. Saltpetre 30 seers per acre ... 2·5
d. Castorcake 5 mds per acre ... ... 2·63
e. Greenmauured with dhaincha sown at 8 srs. per acre ... ... 5·0
f. Greenmanured with sunnhemp sown at 30 srs. ... 5·0

Series (3) Normal transplanting after a harvest of matured jute ... ... 2·0

B. Jute—Red Deshi ... ... 5·0

Series 1. Thinning at different spaces—manured with castorcake 6 mds. per acre—½ acre each.

a. Thinned at 2—3″ apart
b. Ditto 4—5″ „ } 1·0

Series 2. Harvesting at different stages—manured with castorcake 6 mds. per acre—⅓ acre each.

a. In flower
b. Pods half formed } 1·0
c. Seeds, ripe

Series 3. Manuring—one acre each ... ... 3·0

a. Cowdung 100 mds. per acre
b. Castorcake 6 mds. ditto
c. Ditto 3 mds. nitrolim 30 seers per acre

VIII. *Ordinary cultivation* on irregular areas left ... ... 61·75

A. Jute ... ... 6·39

1. Tosha followed by aman paddy—Nagra... ... 3·39
2. Kakya Bombai followed by aman paddy—Nagra ... 1·77
3. Red Deshi on high-land ... ... ·20
4. Kakya Bombai high-land ... ... 1·03

B. Arhar—with 6 mds. lime per acre ashes ... .. ·55

C. Aman paddy, unmanured ... ... 16·57

1. Nagra ... ... 7·54
2. Badshabhog ... ... 3·09
3. Dadkhani ... ... 3·80
4. Samudrabali ... ... ·14
5. Katatibhog ... ... ·12
6. Hatishal ... ... ·55
7. Banktulshi ... ... 1·33

D. Pasture during khariff season (followed by a rabi pulse) 4·12 shewn as in gross area.

E. Autumn and Winter sowings after khariff harvest ... 34·12

1. Kalai, mung, pea, gram, khesari and lentils ... 26·12
2. Mustard, local and Raipur ... ... 6·0
3. Cereals—wheat and barley ... ... 2·0

F. Greenmanuring crops, shown in pages 4, 5 and 6 of the scheme—(shewn as in gross area) ... ... 22·79

Total area under cultivation in 1915-16 ... 228·62 acres

G. Total area under paddy seed beds in 1915-16 (shewn as in gross area) 11·61 acres

Total gross area under cultivation in 1915-16 ... 240·23 acres.

Abstract Statement of Crops in 1915-16.

CROP.	Area under experiments.	Area under demonstrations.	Area under ordinary cultivation.	Total area under cultivation.	REMARKS.
Sugarcanes ...	3·87	...	...	3·87	
Jute—Red Deshi ...	11·87	5·00	·20	17·07	Jute—
„ Ka'kya Bombai	4·67	...	2·80	7·47	Experiment 24·13
„ Belgachia ...	·80	...	...	·80	Demonstration. 5·00
„ Deswal ...	·50	...	...	·50	Ordinary ... 6·39
„ Dhaleswar ...	·51	...	...	·51	
„ Barapat ...	·58	...	...	·58	Total ... 35·52
„ Pure lines ...	1·20	...	...	1·20	
„ Tosha ...	4·00	...	3·39	7·39	
Paddy C. P. Aus ...	5·00	...	...	5·00	Paddy—
„ Karticksal ...	2·00	...	...	2·00	Experiment 66·59
„ Jatakalma ...	2·00	...	...	2·00	Demonstration. 39·08
„ Jhingashal ...	2·00	...	...	2·00	Ordinary ... 16·57
„ Kaminishal ...	2·00	...	...	2·00	
„ Pure lines ...	2·00	...	...	2·00	Total ... 122·24
„ Nagra ...	23·59	39·08	7·54	70·21	
„ Badshabhog ...	4·00	...	3·09	7·09	
„ Dadkhani ...	3·00	...	3·80	6·80	
„ Samudrabali ...	5·00	...	·14	5·14	
„ Kataribhog ...	7·00	...	·12	7·12	
„ Hatishal ...	7·00	...	·55	7·55	
„ Indursail ...	1·00	...	...	1·00	
„ Sada Samba ...	1·00	...	...	1·00	
„ Banktulsi ...	...	...	1·33	1·33	
Arhar ...	...	...	·55	·55	
Chillies ...	1·00	...	...	1·00	
Potato ...	·70	...	...	·70	
Fruit culture ...	3·71	...	...	3·71	Date palms along fencing.
Kharif pasture ...	...	...	...	4·12	
Autumn and winter sowings.	...	...	34·12	34·12	
Green manuring crops.	...	...	...	22·79	Included in gross areas carried direct to total.
Paddy seed beds ...	...	...	...	11·61	
Total ...	100·00	44·08	57·63	240·23	Total gross area under cultivation.

C. L. MUSTAFI,
Superintendent.

Kalimpong Farm.

2. Good work has been done during the year 1914-15. The maize crop was again excellent. Mr. Edmunds who took over charge in June 1914, is now well acquanited with the farm and all the work in hand. Average outturn of 30 maunds of maize per acre over a large area of nearly 20 acres is good enough material to bring to the notice of the cultivators of this hill-side. True these returns were only obtained by heavy applications of farm yard manure, but this practice is being followed by many local people, as is shown by the great difficulty the farm has had this year in getting any outside manure at all. Accordingly we must be wise this year and store as much manure as possible for next year's crops. The outturns of rice were again poor, but I look forward to obtaining in a few years some definite data from rice grown at different altitudes on this hill-side. We are trying rice on 5 acres of land this year at the lowest altitude of the farm. The results will be very interesting. There ought to be no difficulty in obtaining a full supply of water on these lowest plots.

Pineapples have done exceedingly well. Peaches have fruited profusely, but although the fruits are very large, they have not that colour and ripeness that are obtained at Quetta or on the plains. The fruits do very well for cooking. We must try to obtain an early fruiting variety, one that will give ripe fruit in February and March, to see if we cannot get the requisite colour of a dessert peach. The fruits are now harvested in June on the present trees and as the rainy season and mist have then set in, there is no chance of obtaining the requisite colour and bloom.

The rainfall recorded on the farm in 1914-15 was 98·22″ on 137 rainy days as compared with 98·88 on 157 days in 1913 and a normal of 103·01 on 154 rainy days. Accordingly 1914 was a rather dry year. The latter part of the year from September to December, inclusive, only had 7″ of rain as compared with a normal of 20″ and was therefore very dry. This is the chief growing season for rice, and hence 1914 was a very unfavourable year for this as well as for kodo, buckwheat and all rabi crops. The season was quite favourable for maize.

It is evident from Mr. Edmunds' table of crop yields that maize does well on this hill-side, but that paddy is rather poor. Kodo also does well and is a favourite with local cultivators.

Receipts and expenditure for 1914-15 are very satisfactory.

From the figures it will be seen that the farm has had a good year and is in a thriving condition.

I publish Mr. Edmunds' report below :—

F. SMITH,

Deputy Director of Agriculture, Bengal.

ANNUAL REPORT OF THE SUPERINTENDENT OF THE DEMONSTRATION FARM, ST. ANDREW'S COLONIAL HOMES, KALIMPONG, FOR THE YEAR 1914-15.

Situation and History.—The village of Kalimpong is the head-quarter of the Sub-division of Daling (a Government estate of 401 square miles). The district was ceded to the British Government after the Bhutanese War of 1864-65. The settlement of the estate restricts the ownership of land to hill tribes, and at the same time makes provisions by which Lepchas and Bhutias are only allowed to dispose of their land amongst themselves. This condition was introduced to prevent the more thrifty and enterprising Nepalese from becoming possessors of all the land in the district, which would to a great extent have been the case had no steps been taken to prevent it.

All transfers of land go through the Khas Mahal Office, and an annual ground rent of from As. 6 to Re. 1-4 is charged by Government.

Kalimpong has a fairly large bazar and is the mart for produce of a considerably large area in addition to which it is the centre of Tibetan trade with Bengal.

It is 38 miles from Siliguri, Eastern Bengal State Railway, and 28 miles from Darjeeling; Ghoom station 4 miles nearer. Riang, a station on the Siliguri-Tista Valley Extension, Darjeeling-Himalayan Railway, brings Kalimpong to a 16 miles road journey.

The Demonstration Farm is situated below the bazar on the easterly slope which runs down to the Rilli river, a tributary of the Tista, joining the latter at Riang.

Although about 24 acres of land had been cultivated by the Homes prior to April 1907, the remaining portion was not taken over from the native cultivators until December of that year, so it was not till the beginning of 1908 that a proper start was made.

During the first two years much of the time was spent in preparatory works such as erection of farm buildings, boundary pillars, fencing and convenient roads. A few experiments, however, were carried out with various crops.

2. *Area Elevation.*—A survey of the farm was completed in April 1911 at a cost of Rs. 136-0-6. The plots were all numbered and the area computed.

The total area, exclusive of Jhoras, is 60·78 acres, of which 9·54 are occupied with roads, houses, Farm buildings, waste ground and under trees and bamboos, leaving 51·24 acres for cultivation. During the year under report 23·9 acres were under experimental cultivation, the remainder being partly cultivated under ordinary crops and partly given to coolies on half-crop system. The elevation is as follows :—

Lower boundary ...	...	3,317 feet.
Farm building ...	...	3,693 „
Upper boundary ...	...	3,864 „

The level section through the farm from top to bottom shows an average gradient of 1 to 5. This is a very moderate slope for these hills, and gives a situation difficult to improve on for experimental work.

3. *Irrigation.*—The only irrigation necessary is for the rice crop, and this consists of turning the water out of one of the many streams on to the rice terraces when required. In the winter no irrigation is possible, but few crops grow at that season.

4. *Character of the Soil.*—The soil is a rich clay loam, whose reaction is acid.

5. *Meteorology.*—The following table shows the normal rainfall for six years and that of 1914 at the Demonstration Farm :—

Month.	Normal six years.		1914.	
	Rainfall, inches.	Rainy days.	Rainfall, inches.	Rainy days.
January	·63	1	·99	2
February	1·40	4	1·75	3
March	2·16	5	·63	5
April	4·08	17	3·84	19
May	5·30	16	5·18	15
June	15·41	18	14·42	15
July	31·27	27	34·61	27
August	25·68	27	29·54	28
September	8·49	15	6·53	15
October	2·54	5	·21	2
November	3·54	5	·52	6
December	·03	1	Nil.	Nil.
Total ...	100·53	141	98·22	137

1915.	Rainfall inches.	Rainy days.
January	Nil	Nil.
February	3·0	8 days.
March	1·14	9 „

From the table given above, it will be noticed that during the year under report there was more rain recorded in the months of July and August (viz. 64·15 inches) than has been the case since the establishment of this farm.

The season was favourable from the commencement, and the maize crop, ghaiya (dry rice), soy-beans and other pulses were well forward; consequently no damage was done by the heavy rainfall. On the other hand it enables us to transplant our paddy freely. During the last quarter we had a dry spell as compared with our normal, which caused a decrease in yield in paddy, marwa, and various pulses, at the same time our *Rabi* crops, such as buckwheat, wheat, barley, etc., were more or less failures.

6. *Operations during the year.*—A.—*General Crops grown.* The following tables gives the area under each crop grown by the farm, and on the half-share system, with the total outturn, yield per acre, price per maund (82 lbs.) total value of crops :—

Crop.	Area in acres.	Outturn.	Yield per acre	Price per maund.	Total value of crops.	
		Md. Sr.	Md. Sr.	Rs. A.	Rs. A. P.	Rs. A. P.
Maize	17·60	507 16	28 34	3 4	1,649 2 0	1,899 11 0
½ crop maize ...	10·74	77 4	7 0	3 4	250 9 0	
Rice (aman)	9·45	133 35	14 0	3 0	400 14 0	700 6 0
Straw	9·45	278 30	30 0	0 8	139 6 0	
½ Crop rice	6·55	42 10	6 20	3 0	126 12 0	
Do. Straw	6·55	66 30	6 0	0 8	33 6 0	
Kodo	2·25	51 35	23 0	3 6	175 1 3	387 11 3
Kodo ½ crop	10·0	63 0	6 12	3 6	212 10 0	
Ghaiya or aus paddy ...	·75	15 6	20 8	3 0	45 7 6	57 11 6
Ghaiya straws ...	·75	98 0	130 26	0 2	12 4 0	
Buckwheat	3·50	14 0	4 0	2 10	56 12 0	
Bhatmas (Soy beans) ...	2·77	30 36	11 0	3 12	115 14 0	
Kalai	1·0	4 10	4 10	5 8	23 6 0	
Sugarcane (gur) ...	·53	16 30	31 25	8 8	142 6 0	
Gahat	·35	5 25	16 23	3 12	21 1 6	
Potatoes	·8	6 15	76 35	4 8	28 11 0	
Khar (thatching grass) ...	1·50	150 0	100 0	0 8	75 0 0	
Barley	1·0	Failure due to drought.				
Wheat	3·0	Do.	do.	do.		

From the above figures it is evident that maize and kodo in rotation are the most economical crops for this hill side. Kodo, buckwheat, soybeans, kalai and other pulses are grown after maize on the same land in the one year, but none of the latter named crops are so popular as kodo. Rice grown on the half-crop system is much more profitable than when grown by the farm, due to heavy expenses incurred in cultivating rice on these hill-sides. Maize, kodo, pulses and buckwheat grown on the half-share system are not so profitable as rice, but they all yield a much larger return than is obtained by mere rent.

B.—*Experimental Work*—

Primary ... (1) Maize. (2) Winter rice (*aman dhan.*)

Secondary ... (3) Autumn rice (*aus dhan.*) (4) Kodo. (5) Buckwheat. (6) Soybeans. (7) Miscellaneous.

B. 1. Zea mays—maize—makai—bhutta.

In 1907-08 experiments were commenced with a view to improve the crops as grown in this district, and also to compare it with Jaunpur maize. The latter after two years' trial, with poor results, was discontinued. Attention was then concentrated on the improvement of the local varieties by means of seed selection.

The maize at the commencement was of a very mixed nature, containing seeds of all colours, and required seed-to-seed collection. The first few years' trials, however, separated the crops into several varieties, and by the subsequent selection of the best cobs of each type we have obtained five varieties fairly true to type, *i.e.*, yellow round, yellow flat, white round, white flat and red round.

The average outturn of maize of all varieties under cultivation for the last few years is here given :—

	Mds.	srs.		Per acre. Lbs.
1909-10	21	21	or	1,764
1910-11	27	25	„	2,264
1911-12	30	9	„	2,478
1912-13	33	8	„	2,722
1913-14	33	30	„	2,767
1914-15	30	39	„	2,539

These are remarkable figures and a striking illustration of the benefit to be derived from careful selection of seeds.

Seeds sown at the rate of 25 seers per acre between the 2nd and 3rd weeks of March and manure applied at the rate of 250 maunds per acre. Crop was harvested from the end of August to 1st week of September. The proportion of grain to cobs with leaves attached was 51·2 per cent.

(A). *Varieties.*—The variety experiment has shown the following results :—

Variety.	Outturn.					
	1909	1910	1911	1912	1913	1914
Yellow round	19¼	29½	33¼	37	37¼	33¾
„ flat	37¼	36¼	36	31	26¾	22
White round	26¼	32¾	33¼	29	33¼	37
„ flat	28¼	35½	29¾	41½	35	31¼
Red round	19¾	30¼	31¼	37	30½	30½

These outturns are from one-acre blocks, and the figures backed up by the average for the farm require no comment.

(B). *Effects of Terracing.*—To compare the result of growing ordinary crops (not irrigated rice) on terraced and unterraced land, 2 acres were selected as uniform in fertility and slope as is possible to find on the farm. One acre was terraced at a cost of Rs. 107-5-6. Each plot receives similar treatment, equal amounts of manure and seeds being applied to each.

The following table shows the outturn and cost of production of maize and secondary crops for the last four years.

Terraced Acre.			Unterraced Acre.		
Crop.	Outturn.	Cost of Cultivation.	Crop.	Outturn.	Cost of Cultivation.
1911-12	Mds. srs.	Rs. A. P.	1911-12	Mds. srs.	Rs. A. P.
Maize ...	33 5	40 1 3	Maize ...	38 32	41 11 0
Soybeans— Grain ...	11 35	20 8 6	Soybeans— Grain ...	9 22	24 4 0
Straw ...	15 20		Straw ...	12 10	
1912-13			1912-13		
Maize ...	32 38	44 14 6	Maize ...	36 2	44 14 6
Kodo— Grain ...	22 10		Kodo— Grain ...	24 20	
Straw ...	Estimated Rs. 5.	49 6 3	Straw ...	Estimated Rs. 5.	52 15 3

TERRACED ACRE.				UNTERRACED ACRE.			
Corp.	Outturn.	Cost of Cultivation.		Corp.	Outturn.	Cost of Cultivation.	
1913-14				1913-14			
Maize ...	30 0	37 10	0	Maize ...	35 20	37 10	0
Kalar—				Kalai—			
Grain ...	5 0	25 0	0	Grain ...	4 30	25 0	0
Straw ...	6 30	0 13	6	Straw ...	5 0		
1914-15				1914-15			
Maize ...	31 12	37 9	0	Maize ...	35 31	38 1	0
Buckwheat local	4 15	14 9	0	Buckwheat local	4 20	14 9	0

During the four years of experiments, maize has been grown on these plots with soybeans, kodo, kalai dal and local buckwheat as secondary crops. So far the outturn of maize has been higher on the unterraced plots. It is now only a matter of a year or two for us to judge which area, terraced or unterraced, will in the long run give the best results. Unless and until the subsoil on the new terraced area gets thoroughly mixed with manure, we cannot definitely say which is advantageous.

It is interesting to note that the secondary crops, soybeans and kalai (pulses) gave higher yields on the terraced acre, while kodo and buckwheat (cereals) gave a greater yield on the unterraced area.

(C). *Manurial experiment.*—Three plots of half acre each have been reserved for this experiment since 1910-11. The condition of the soil and its situation is parallel with each other.

The following results were obtained with maize and Japanese buckwheat :—

Maure per acre.	Outturn of Maize. MDS. SRS.	Outturn of Buckwheat. MDS. SRS.
1. One hundred maunds manure, 2 maunds super-phosphate.	29 8	3 24
2. One hundred maunds manure	27 14	3 36
3. Unmanured	24 30	1 34

The above figures are not very definite, and the test should be continued for a number of years, before the action of super-phosphate on this farm can be definitely shown. The unmanured plot gave the poorest outturn and if the experiment is carried out on the same plots, the figures may be expected to prove greater differences.

The extremely poor yield of the secondary crop can only be attributed to the deterioration of the Japanese buckwheat seed, together with the drought it experienced when rain was needed.

The following are the details of cost of cultivation of one acre of maize :—

1914-15.	Particulars.	Cost. RS. A. P.
February 3 ...	... Ploughing	3 0 0
Ditto 6 ...	... Manure and cost of spreading ...	15 10 0
Ditto 7 ...	... Breaking clods	1 6 0
March 19 ...	... Ploughing	1 14 0
Do. 19 ...	... Twenty-five seers of seed ...	2 5 6
Do. 19 ...	... Breaking clods	0 11 0
May 10 ...	... Thinning	0 8 0
Do. 16 ...	... Hoeing	2 8 0
June 13 ...	... Thinning and hoeing ...	2 4 0
August 31 ...	... Harvesting	4 0 0
March 8 (1915)	... Hulling, etc.	3 8 0
	Total ...	37 10 6
	Yield—Maunds 30—17 seers at Rs. 3-4 ...	99 1 0
	Profit	61 6 6

Out of an area of 28·34 acres under maize cultivation during 1914-15 23·34 were under the yellow round variety which seems to be both the most profitable and profitable for cultivation.

The white round variety is another favourite amongst the natives of this hill-side.

Oryza Sativa—Winter Rice—Dhan—Transplanted rice.

Owing to the proximity of this farm to the hill ridge a very limited space is left to act as collecting ground for water, and the crop in consequence is almost entirely dependent on rainfall during these months to ensure the continuous supply of water so essential for its growth. The seed-beds are sown by the end of May; and transplanting commenced by the end of June and completed by the end of July.

The following table gives the area, outturns, and yield per acre of each variety grown on this farm :—

Rice—1914-15.

	Varieties.	Area.	Outturn.	Yield per acre.
		Acres.	Mds. srs.	Mds.
Variety ...	Touli	2·04	28 10	13⅞
	Do.	2·57	42 10	16½
	Do.	2·58	37 20	14¼
	Do.	¼	3 25	14½
	Ratomarsi	¼	2 25	10½
	Mansaura	¼	2 25	10½
	Timurah	¼	1 15	5½
	Ramtulshi	¼	2 0	8
Manure ...	Touli (*nil*)	·33	5 15	16⅛
	Do. (G. M. Soybean) ...	·33	4 15	13⅛
	Do. (50 maunds cowdung) ...	·33	3 25	10⅞

Touli (which gives a large whitish grain) is the best yielder on the farm, consequently most of the paddy area was under this variety. During the harvesting a very careful selection of seed was made throughout, results of which should be interesting.

(*a*) The following table gives the figures from 1911 to 1914 for the variety experiment :—

Variety.	Outturn per acre.							
	1911-12.		1912-13.		1913-14.		1914-15.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds.
Touli (Hill rice) ...	14 16	44 28	14 35	26 0	10 20	32 0	14 20	34
Dhanasi	15 8	35 28	11 39	27 12	13 20	34 0	...	...
Krishnabhog	15 4	60 36	8 0	50 32	...	...	...	...
Mansaura	11 32	39 24	13 25	22 16	13 20	38 0	10 20	24
Ratomarsi	17 0	39 8	13 6	20 32	9 10	26 0	10 20	24
Ramtulshi	19 8	53 20	7 16	35 28	8 30	40 0	8 0	28
Timurah	...	...	...	...	11 30	37 20	5 20	36

The figures of 1912, 1913 and 1914 show a considerable decrease in outturn from those of 1911-12, except in the case of touli, which year after year has shown marked consistency in these tests irrespective of climatic conditions.

The fertility of the soil and the supply of water has much to do with the above results, and as this is one of the draw-backs in this area, the

figures must stand good for the present until a more suitable area can be selected for this test.

(*b*) During the past six years an experiment has been conducted to test the effect of green-manuring on rice-crops as compared with farm-yard manure and unmanured.

The results of the last two years are here recorded—

Manure.	Outturn per Acre.			
	1913-14.		1914-15.	
	Grain.	Straw.	Grain.	Straw.
	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.
1. Unmanured	11 25	32 25	16 15	39 0
2. Fifty maunds cowdung ...	9 15	28 8	10 35	24 30
3. Green manure "Soybeans" Bhatmas.	9 0	27 0	13 5	36 0

So far as manures for rice are concerned, the unmanured plots continue to yield as heavy crops as those manured with 50 maunds cowdung or those green manured with soybeans. This applies particularly to areas supplied with rain-water flowing through the Kalimpong bazar into the various streams.

Details of operations of a rice area as undertaken on the farm, produced from the cultivation book, is appended :—

Area, 2·57 acres.

Variety—Touli, Unmanured.

Date. 1914.	Particulars.	Cost. Rs. A. P.
May 4th ...	Ploughing seed-beds	0 15 0
„ 12th ...	Cutting alis	0 10 0
June 6th ...	Preparing seed-beds and sowing seeds	1 14 0
Ditto ...	2 maunds 25 seers seeds	8 3 0
June 23—25th ...	Ploughing area	8 8 0
„ 25-26th ...	Cutting alis	8 8 0
July 13—16th ...	Second ploughing	6 0 0
Ditto ...	Building alis	6 0 0
July 18—21st ...	Levelling with dandy	4 2 0
Ditto ...	Ditto hands	4 12 0
Ditto ...	Transplanting	9 12 0
October 2—5th ...	Weeding	13 0 0
November 20—26th	Harvesting, carrying, etc. ...	10 0 0
December 4-5th ...	Threshing, winnowing, etc. ..	13 2 0
Ditto ...	Irrigation during the whole period ...	10 4 0
	Total cost of 2·57 acres ...	105 10 0
	Value of yield ...	161 12 0
	Profit ...	56 2 0

B. (3) *Eleusine Coracana—Millet—Marwa—Kodo.*—This crop grows in rotation with maize and is transplanted from the third week of June to the end of July, so that when the maize crop is harvested in August, the kodo covers the land.

The following table shows the average outturns per acre from 1909 to 1914 :—

	Mds.
1909	26
1910	19¾
1911	22¾
1912	23½
1913	27½
1914	23

While the following table gives details of cultivation and cost per acre :—

Kodo—1 acre.

			Rs.	A.	Rs.	A.
Seed-bed—						
January 30th	...	Ploughing ...	0	5		
April 29th	...	Ditto ...	... 0	5		
Ditto	...	Manure ...	... 2	8		
May 21st	..	Breaking clods	... 0	10		
Ditto	...	12 seers seeds	... 1	2		
June 20th	...	Weeding ...	... 0	6		
					5	4
In maize crop—						
July 4—11th	...	Weeding ...	... 1	0		
Ditto	...	Digging ...	... 2	0		
Ditto	...	Transplanting	... 15	0		
September 4-5th	...	Cutting maize stalks	... 1	8		
„ 7-8th	...	Weeding ...	... 8	8		
November 17-18th	...	Harvesting and carrying to godown ...	... 9	2		
December 19—23rd	...	Threshing, weighing, etc.	5	0		
					42	2
		Total cost of 1 acre	...	...	47	6
		Yield, Grain 24 maunds at Rs. 3-6	... 81	0		
		Straw estimated per acre ...	... 5	0		
					86	0
		Profit	...	...	38	10

4. *Fagopyrum Esculentum—Buckwheat—Phaphar.*—This crop is grown in rotation after maize. Seed is sown in September and is ready for harvesting at the beginning of December. A variety test is being continued since 1911 with Japanese and local buckwheat with the following results :—

Variety.		Yield per acre.		
		Area.	Grain.	Straw.
		Acre.	Mds. s.	Mds. s.
1911	Japanese Buckwheat ...	·5	1 30	2 16
	(Local) „	·5	12 24	50 10
1912	Japanese Buckwheat ...	·5	9 0	12 26
	Buckwheat (Local)	·5	9 24	27 0
1913	Japanese Buckwheat ...	·5	9 15	10 10
	Buckwheat (Local)	·5	12 0	55 0
1914	Japanese Buckwheat ...	·5	3 36	8 10
	Buckwheat (Local)	·5	4 20	17 5

From these figures there is no reason to change the local variety, the more so as no cultivator is anxious to try the foreign variety.

The following table shows the cost and details of cultivation of this crop :—

Buckwheat—1 acre after Maize.

			Rs.	As.
September 12th	...	Cutting and carrying maize stalks ...	1	13
„ 15th	...	Ploughing	3	12
„ 22nd	...	Sowing seeds	2	4
„ 22nd	...	30 seers seed	1	14
December 14th	...	Harvesting, threshing and carrying ...	4	14
		Total ...	14	9
		Value of yield ...	11	13
		Loss ...	2	12

These varieties of wheat local, Pusa No. 12,. and Duram (dry) were tried on an acre plot each; due to drought, from October 1914 to February 1915, the crop (the little there was) had to be grazed down.

An acre under local barley was treated likewise.

5. *Unirrigated Rice* (Aus dhan or Ghaiya).—This crop is sown, usually broadcast on the slopes, but on the farm the practice is to sow it on the ridge and furrow system.

In 1913 on half an acre an outturn of 11¼ maunds grain *plus* 74½ maunds straw was obtained at an expenditure of Rs. 18-7, and in 1914 on three-fourths of an acre an outturn of 15 maunds 6 seers of grain *plus* 98 maunds of straw was obtained at an expenditure of Rs. 29-9. This crop does exceedingly well on a well drained and exposed area, and by sowing seeds on ridge system in rows 1 foot apart and seeds dibbled 8 inches apart.

Leguminous.—The following crops belonging to this order are grown in the district and on this farm :—

Rotanical name.	English name.	Nepalese name.	No. of varieties.	REMARKS.
Glysine hispida ...	Soybean ...	Bhatmas ...	6	Lepcha, name, Selliyan.
Phaseolus mungo ...	Dal ...	Dal-Kalai ...	3	
Ditto radiatus ...	„ ...	Mungi-Dal ...	1	
Ditto calcaratus ...	.....	Mashyem ...	3	
Ditto sublobatus ...	.....	Ditto ...	1	This species is often called Gurans.
Dolichos biflorus ...	.....	Gahat ...	2	

Soybean.—The following varieties were grown on the farm :—

Variety.	Area.	OUTTURN PER ACRE.		OUTTURN PER ACRE.		OUTTURN PER ACRE.		REMARKS.
		1912 grain.	1913 straw.	1913 grain.	1914 straw.	1914 grain.	1915 straw.	
		Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	
Nepali Bhatmas	·5	14	10	16¼	14	20½	23	Whole season crop grows alone.
Barmeli ...	·5	5	7	13	20	8½	15	Grow in rotation with maize.
Green ...	·5	4½	6	13	20	8⅞	14½	
Chocolate ...	·5	9½	16	14½	19½	9¾	17½	
Black ...	·5	6¼	13	11¼	17¼	8¼	19	

The first two varieties in addition to the white, which is not grown on this farm, belong to the erect growing varieties, while the last three mentioned are of trailing habits.

All these leguminous, crops can be grown in rotation with maize. However, Nepali soybeans produce very little when grown along with the maize, but when grown alone they yield heavily. They cannot, however, compete with maize. The cost of cultivation of these crops is Rs. 27 per acre, except Nepali variety which, when grown alone in the open, costs Rs. 55 per acre. The value of Nepali soybeans is Rs. 4-8 a maund and of the other varieties Rs. 3-1, Rs. 3-12.

(B)—(7) 1. *Jute.—Corochorus Capsularis.*—This crop was tried for three years, an outturn of 2½ maunds per acre was the best yield we could obtain, subsequently it was discontinued.

2. *Saccharum Officinarum—Sugarcane.*—This crop takes 18 months to come to maturity on this hill-side as compared with 10 months on the plains. It is profitable to grow a small area for chewing purposes. This year instead of the canes being sold to outsiders from November to March

a sugarcane mill and pan were purchased from Messrs. Burn & Company, Howrah, for a sum of Rs. 95, including railway freight, cart-hire, and from an area of ·53 acre an outturn of 16 maunds 30 seers of *gur* was obtained and sold at Rs. 8-8 per maund of Rs. 142-6. In comparison with the proceeds of last year from chewing canes (sold for Rs. 93), the *gur* at an extra cost of Rs. 23 showing a clear profit of Rs. 26-6 ; besides this Rs. 10 worth of chewing canes were sold and 3,500 cuttings for seed purpose for extending this cultivation were made.

3. *Phaseolus—Mungo—Dal—Kalai.*—One acre was cultivated under this crop and an outturn of 4 maunds 10 seers was recorded as compared with 5 maunds 2 seers for last year. The dry spell and the high elevation of the field selected, accounts for this decrease.

4. *Dolichos biflorus—Gahat.*—An area of ·35 acre under this crop was tried, and an outturn of 5 maunds 25 seers of seeds were obtained, that is on an average of 16½ maunds per acre. The figures show a good result giving a clear profit of Rs. 27-14 per acre, after deducting cultivation expenses.

5. *Potatoes.*—An experiment was tried with 1 maund of Italian potatoes on an area of ·8 acre, and an outturn of 6 maunds 15 seers was obtained. There being no source of irrigation, a better yield could not be expected. The total cultivation expenses were Rs. 24-7 including the price of seed and cooly hire (Rs. 17). The potatoes were sold at Rs. 4-8 per maund—Rs. 28-11, thus yielding a clear profit of Rs. 51 per acre.

6. *Fruit culture.*—One hundred and fifty-eight fruit trees were ordered from Messrs. Bunyard & Co., Maidstone, Kent, and received in December 1907. The trees were first grown under shade until conditions were favourable for out-door planting. The larger varieties were planted in June 1908, and the remainder in 1909.

The following table shows the number of trees received, and the number living at the end of each year after planting :—

Kind of trees.	Number imported.	1910.	1911.	1912.	1913.	1914.
Apple	12	8	5	2	2	2
Apricot	12	5	2	2	2	2
Nectarine	6	1	1	...	...	...
Plum	24	11	6	4	4	3
Cherry	18	7	7	6	6	5
Pear	18	4	3	3	1	1
Peach	6	...	...	...	...	...
Walnut	6	6	6	6	6	4
Fig	6	5	2	2	2	2
Wine	6	3	3	3	2	1
Gooseberry ...	12	...	...	...	...	...
Current	12	...	...	...	...	...
Raspberry ...	20	...	...	...	...	...
Total ...	158	50	35	28	25	20

These English fruit trees have received every attention and care, the rainfall being too high and the site seems to be unfavourable needing a much higher elevation than 3,600 feet being the elevation of the present area.

Nine Australian Naval orange trees were planted on 18th May 1911 and gives promises of doing well. These trees were purchased from Messrs. E. and W. Hackett of Adelaide.

Pine apples.—Suckers of the "Queen" pine were obtained from the Kalimpong Government Fruit Nurseries in August 1908 and planted on ·15 acre. The produce of this crop is as follows :—

Year.	Number of Pines.	Value. Rs.	A.	P.
1909	36	2	4	0
1910	340	45	1	6
1911	476	85	5	0
1912	719	112	5	6
1913	894	139	11	0
1914	937	117	2	0

The pines were sold at an average price of 2½ annas up to 1913 and during 1914, an all round price of 2 annas each was charged. Half an acre of land near the farm buildings has been planted out with this crop. This "Queen" variety is much sought after by the villagers, and a large number of suckers have been supplied.

Bananas, limes, papayas, peaches, oranges and guavas are also cultivated largely, and from an area of 2½ acres under fruit the sum of Rs. 364-14-9 was realized. This includes the pines.

7. *Receipts and Expenditure.*—A copy of the Balance Sheet for the year ending 31st March 1915 is here given.

Receipts—	Rs.	A.	P.	*Expenditure*—				Rs.	A.	P.
Balance from 1913-14	1,887	12	10	Labour	1,895	15	9			
Government grant	5,000	0	0	Superintendence ...	2,116	1	6			
Farm produce	4,071	4	3					4,112	1	3
Miscellaneous receipts	251	8	6	Miscellaneous seeds, manures, repairs, postage, etc.				585	7	0
Bullocks	120	15	0	Bullocks				211	0	0
				Capital outlay				915	15	6
				Road and drains				692	0	0
				Manager's house repairs—furniture				865	1	8
				Implements				136	3	0
				½ Crop to homes				2,027	6	9
				Balance in hand carried forward				1,786	5	5
Total	11,331	8	7	Total.				11,331	8	7

The value of the total produce sold shows an increase of Rs. 783-12 over that of 1913-14, while the wages bill for monthly and daily labour shows a decrease of Rs. 169-7-3.

8. *Acknowledgment and training.*—We are again indebted to Mr. H. F. Green of Mungsong for his kindness in valuing the farm stock, as at 31st March 1915 was Rs. 2,230 as compared with 31st March 1914, Rs. 2,348-1.

During the months from July to October 1914 four boys of the Homes (now in New Zealand) came down twice a week for instruction and practical training in general agriculture and fruit farming. Besides these the Rev. Dr. Sutherland visited the farm with a number of Masters and senior pupils of the Normal School, on four occasions, 1st for selection of maize for seed purpose on the field at the time of harvesting, 2nd at the time of final selection in March for immediate sowing: 3rd during paddy seed selection and on the 4th occasion for grafting and making gooties on fruit trees. On each of these visits lectures were given on the above points and every one made his own selections and experiments.

The following seeds were distributed during the year 1914-15 :—

	Mds.	srs.	lbs.
Maize	9	15	= 768
Paddy	2	14	= 192
Juar	0	8	= 16
Soybeans	18	½	= 1,477
Pine apple suckers		...	374

The above were supplied locally and to people outside this district.

9. *Management.*—The land for the farm was bought by the St. Andrew's Colonial Homes, and is subject to an annual rental of Rs. 70-1.

The farm is managed by the St. Andrew's Colonial Homes, and the Bengal Government grant of Rs. 5,000 *plus* half the sale-proceeds are sufficient to pay for the upkeep of the farm. The remaining half of the sale-proceeds are credited to the Homes. Mr. H. R. Edmunds took over charge on 15th June 1914.

The programme of work for this farm is drawn up in consultation with the Agricultural Department, Bengal.

Mr. J. R. Blackwood, Director of Agriculture, Bengal, inspected the farm in April 1914 and Mr. F. Smith, Deputy Director of Agriculture Bengal, inspected the farm in June and October 1914.

His Excellency the Governor of Bengal, the Hon'ble Mr. W. R. Gourlay, Mr. T. Rankin, Deputy Commissioner of Darjeeling, and Mr. G. P. Hector, Economic Botanist to the Government of Bengal, visited the farm.

HENRY R. EDMUNDS,

Superintendent.

KALIMPONG.

3. Burdwan Farm.

This little farm did some useful work during the year. Babu Jogendra Charan De, the young man in charge, is beginning to get some experience of local conditions. Outturns of 100 maunds (82 lbs.-1 maund) of *gur* per acre from white tanna sugarcane; 186¾ maunds of potatoes per acre; 15 maunds of jute fibre per acre and 14 maunds of paddy per acre show that the Superintendent has displayed some energy during the period under review.

I am glad to note that receipts rose to nearly Rs. 2,000 during the year, although ordinary expenditure amounted to Rs. 3,263-0-9. Expenditure should not exceed Rs. 2,500, while receipts ought to about cover expenditure, in order to say that this farm is well managed. I give below the Superintendent's *verbatim* report—

F. SMITH,

Deputy Director of Agriculture, Bengal.

Summary.

Area and soil.
Soil analysis.
Irrigation and drainage.
Meteorology.
Operation of the year 1914-15.
Paddy.
Statement of outturn per acre.
Jute.
Potatoes.
Sugarcane.
Result of sugarcane.
Conservation of cowdung.
Distribution of seeds.
Practical training of apprentices.
Management.
Appendix I—(Farm Account, 1914-15).
" II—(Statement of area and outturn of crops, 1914-15).
" III—(Result of Potash Syndicate's Experiment, 1914-15).
" IV—(Cropping Scheme, 1915-16).

ANNUAL REPORT OF THE SUPERINTENDENT OF THE BURDWAN AGRICULTURAL STATION FOR 1914-15.

This agricultural station was opened in the year 1885 and carried experimental works till the year 1911, when the demonstration work was taken up.

Area and soil.—The total area of the farm is 32 acres. The site was originally a piece of waste land overgrown with jungles.

The soil is a poor sandy loam mostly resembling to pure sand.

The following table gives the Chemical Analysis of average samples of soil and sub-soil of the whole farm:—

	Soil 1st 9".	Sub-soil 2nd 9".
Insoluble silicate and sand	88·52	87·47
Ferric oxide	3·60	3·68
Alumina	4·42	5·27
Lime	·34	·33
Magnesia	·34	·31
Potash *	·31	·32
Soda	·09	·07
Phosphoric acid	·02	·03
Sulpheric acid	·01	·01
Carbonic acid	·04	·06
Organic matter and combined water	2·31	2·45
Total ...	100·00	100·00
* Available Potash	·04	·02
Ditto Phosphoric acid	·002	·001
Nitrogen	·011	·007

The figures denote that the land is exceedingly poor in nitrogen and phosphoric acid and poor in lime, but possibly contains enough potash.

Irrigation and Drainage.—The farm is irrigated from the Eden canal running alongside it. Part of the area about 20 acres can occasionally be irrigated by flow during the rainy reason—provided the main Damodar river is fed by flood. For rest of the season the lands are to be irrigated by three or more lifts.

During the year under report the canal ceased supplying water practically from the 1st of August, owing to the want of flood in the Damodar and kindly granted an omission of water-rate for 20 bighas—say 6⅔ acres.

Meteorology.—The following table gives the normal rainfall at the Burdwan Civil Station and the actual rainfall recorded on the farm :—

Name of month.			Actual rainfall in inches.	Number of rainy days.	Normal of 40 years.	Normal of rainy days.
April	1914	...	1·52	3	2·20	3
May	„	...	10·59	7	5·56	6
June	„	...	8·08	10	10·17	12
July	„	...	14·8	21	12·32	15½
August	„	...	7·14	16	11·49	15
September	„	...	6·49	10	8·59	11
October	„	...	1·15	3	3·93	4
November	„	...	...	...	0·64	¾
December	„	...	0·77	2	0·13	¼
January	1915	...	...	...	0·38	¾
February	„	...	0·61	1	0·89	1½
March	„	...	4·96	5	1·24	1¾
	Total	...	56·11	78	57·54	71½

The rainfall in May went much up to the normal (viz., 10·59—5·56 normal). This sudden outbreak of monsoon caused the jute crop to suffer much in its infancy.

The insufficient rains during the latter part of the kharif season caused a poor outturn of paddy crop.

Operations of the year—

(1) Demonstration work.

(2) Conservation of cowdung.

(3) Distribution of seeds.

(4) Practical training of apprentices.

1. *Demonstration Work.*—The demonstration work on the following crops was taken up during the year under report :—

A.—Paddy.
B.—Jute.
C.—Potatoes.
D.—Sugarcane.

A.—Paddy.

I. The following manurial demonstrations were made :—.

(1) Green manure with dhaincha.

(2) Ditto 5 maunds lime per acre.

(3) Sixty maunds cowdung per acre (Farm).

(4) Ditto (Raiyats).

(5) Unmanured (last year bonemeal).

(6) Unmanured.

(7) Paddy after jute.

II. The following table gives the area, total outturn and per acre against the above items :—

Serial No.	Manure per acre or nature of treatment.	Area in acres.	Total outturn.	Outturn per acre.	Value per acre.	Cost per acre.	Profit or loss.	REMARKS. G Grain. S Straw.
			Mds. Sr.	Mds. Sr.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
1	Sixty maunds farm cowdung ...	1	G 18 20 S 35 0	G 18 20 S 35 0	55 0 0	32 12 6	22 3 6	
2	Sixty maunds raiyats' cowdung	4	G 66 20 S 116 0	G 16 25 S 29 0	48 13 0	29 7 0	19 6 0	
3	Green manure with dhaincha 5 maunds lime.	1	G 17 5 S 30 0	G 17 5 S 30 0	50 0 0	29 13 0	20 8 0	
4	Green manure with dhaincha ...	1½	G 23 10 S 34 35	G 15 20 S 23 10	44 9 0	25 5 4	19 3 8	
5	Unmanured (last year Bonemeal)	3	G 39 30 S 63 15	G 13 10 S 21 5	38 6 6	19 12 7	18 9 11	
6	Unmanured	3	G 31 20 S 48 12	G 10 20 S 16 4	30 4 4	17 10 1	12 10 3	
	Paddy after jute	3·8	G 4 16 S 5 0	G 1 7 S 1 12	3 4 0	3 15 3	6 11 3	Completely failed on account of drought.

N.B.—Non Demonstration :—

1	2	3	4	5
			Mds. Sr. Ch.	Mds. Sr. Ch.
Grain ...	Seed-bed ...	1	12 15 0	12 15 0
	Potash Syndicate ...	·64	12 34 0	20 2 0

B.—Jute.

This year we demonstrated the following varieties of jute with the following results :—

N. B.—Manured with 100 maunds cowdung.

Serial Number.	Varieties.	Area in acre.	Total outturn.	Outturn per acre.
			Mds.	Mds. sr.
1	Corchorus Capsularis.	2	29	14 20
2	Corchorus Olitorius	1	16	16 0
3	Corchorus Capsularis and Corchorus Olitorius (for seed).	0·8	...	...
		3·8		

C.—Potatoes.

The demonstration with the following varieties were made and with the following result :—

Serial Number.	Varieties.	Area in acres.	Total outturn.	Outturn per acre.	REMARKS.
			Mds. sr.	Mds. sr.	
1	Italian ...	1	186 28	186 28	
2	Nani Tal ...	·2	12 0	60 0	Failed to germinate well.

The Italian yielded well.

D.—Sugarcane.

The following demonstrations were carried on with sugargane crop :—

I. Trench and furrow system.

Versus—

II. Local method.
III. White tanna canes.
IV. Khari canes.

Versus—

V. Local canes.
VI. Ratooned canes of khari and tanna.

N. B.—Please see Appendix III for the Potash Syndicate's Experiment. →

The following table will give the result of sugarcane demonstrated as noted above :—

1. System of cultivation. 2. Varieties. 3. Ratoon.	Outturn per acre.	Value of outturn.	Cost of cultivation.	Profit or loss.
	Mds. sr. ch.	Rs. A. P.	Rs. A.	Rs. A. P.
1. White tanna (Trench and Furrow System).	(1) 98 10 8	638 11 3	324 4	314 7 3
2. Local method ...	(2) 80 15 0	522 7 0	330 12	191 12 0
2. White tanna canes.	(3) 100 20 0	653 4 0	324 4	329 0 0
Khari canes ...	(4) 59 15 0	385 15 0	265 8	120 7 0
Local canes ...	(5) 40 20 0	263 4 0	329 10	*
3. Ratooned canes—				
Khari ...	(6) 48 35 8	317 12 3	221 4	96 8 3
White tanna	(7) 85 20 0	555 12 0	290 12	265 0 0
Local canes ...	(8) 46 15 0	301 7 0	295 8	5 15 0

* Local canes require special attention, hence the cost of cultivation exceeds that of Khari and White Tanna.

NOTE.—As most of the canes were made into cuttings, one cottah from each plot was harvested and the figures that were obtained are recorded in columns 3 and 5.

2. *Conservation of cowdung.*—The local cultivators are beginning to appreciate the system of protecting cowdung with cattle urine in a water-tight pit under shade.

The demonstration was made with paddy showing the superiority of the farm cowdung to that of raiyats :—

	Farm.	Raiyats.	
	Mds. sr.	Mds. sr.	
Grains	18 20	16 25	per acre.
Straw	35 0	29 0	

3. *Distribution of seeds.*—The farm endeavours to supply all demands made up on it for seeds and seed cuttings.

The following seeds were supplied during the year under report :—

		Mds.
A. Paddy—		
Varieties	Karticksal	... 6
	Jatakalma Karticksal ...	... 6
B. Jute—		
Variety Corchorus Capsularis ...		... 1
		No.
C. Sugarcane—		
White tanna		... 64,000
Khari		... 65,000
D. Dhaincha		... ¼ md.

4. *Practical training of Apprentices.*—Students receive practical training in this farm. There is want of accommodation. Two students received training during the year under report—one from April to November, and the other from November to March.

Management.—The expenses of the farm are borne by the Maharajadhiraj of Burdwan to whom thanks are given. The entire management is in the hands of the Agricultural Department, and Jogendra Ch. De was the Superintendent in charge of the farm throughout the year.

The Deputy Director of Agriculture, Bengal, inspected the farm frequently, and the Director of Agriculture visited the station once during the period under report.

JOGENDRA CH. DE,

Supdt., Burdwan Agricultural Station.

APPENDIX I.

Farm Accounts 1914-15.

RECEIPTS.

Particulars.	Amount.		
	Rs.	A.	P.
Grant from Burdwan Raj	2,500	0	0
Deposited into treasury as sale proceeds ...	1,386	0	3
Bills receivable	460	0	0
Stock in hand	79	3	0
Total ...	4,425	3	3
Balance carried forward ...	1,162	2	6

EXPENDITURE.

Particulars.	Amount. Rs. A. P.	Amount. Rs. A. P.
Establishment—		
Superintendent's pay and travelling allowance.		629 8 0
Pay of apprentices		85 5 3
Capital—		
Construction and repairs (flood damaged).	276 8 6	
Implements	37 8 9	
Furniture	6 8 0	
Purchase of live-stock ..	100 0 0	
		420 9 3
Cattle food		106 11 6
Extra labour		2,136 10 9
Manures		118 2 6
Seeds		17 8 0
Office expenses		3 1 0
Contingencies		67 7 6
Stamps		12 0 0
Taxes and water-rate		57 8 0
Miscellaneous		29 2 3
Total		3,683 10 0

APPENDIX II.

Statement of crops grown and their outturn during the year 1914-15.

Serial No.	Crops.	Area in acre.	Outturn. Mds. sr. ch.	Outturn per acre. Mds. sr. ch.
1	Paddy	16·14	228 10 0	14 5 0
2	Jute fibre	3·	45 0 0	15 0 0
	„ seeds	0·8	4 0 0	5 0 0
3	Potatoes, Naini Tal	0·2	12 0 0	60 0 0
	Do. Italian	1·	186 28 0	186 28 0
4	Sugarcane, new	1·60	60 22 11	37 33 0
	Do. ratooned*	1·49	43 6 13	28 30 0

* The actual figure is noted. Most of the canes were made into cuttings.

APPENDIX III.

Results of Experiments made with Potash manures on Paddy, 1914-15

Manures.	Outturn per acre.	Value of outturn per acre.	Cost of cultivation per acre.	Profit per acre.
Paddy, variety Karticksal (Manure per plot mg : ·16 acre).— lbs.	Mds. srs. ch.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Oilcake ... ... 40 Sulphate of ammonia ... 14 Super ... ... 28 Muriate of potash ... 10	Grain 20 32 13 Straw 38 mds.	61 8 9	43 13 6	17 11 3
2. Oilcake ... ... 40 Sulphate of ammonia ... 14 Super ... 28	Grain 20 14 1 Straw 35 mds.	59 10 0	41 14 3	17 11 9
3. No manure	Grain 10 20 0 Straw 16 4 0	30 4 4	17 10 1	12 10 3
4. Sulphate of ammonia ... 14 Muriate of potash ... 10	Grain 20 1 7 Straw 32 20 0	55 14 6	30 13 5	25 1 1
Sugarcane (variety White Tanna).				
* Manure in ·20 plot— lbs.				
1. (*a*) New crop— Sulphate of ammonia ... 40 Super ... ... 36 Sulphate of potash ... 27	*Gur* Mds. sr. 102 10 0	664 10 0	350 5 0	314 5 0
(*b*) Sulphate of ammonia 40 Super. 36	98 25 0	641 1 0	331 8 0	309 9 0
2. Ratoon crop— (*a*) Sulphate of ammonia 40 Super ... ... 36 Sulphate of potash ... 27	82 15 0	535 7 0	296 10 0	238 13 0
(*b*) Sulphate of ammonia 40 Super 36	77 35 0	506 3 0	288 14 0	217 5 0

* Manures mentioned were applied in ¼ acre plot manured with castor cake 9 mds. per acre.

Cropping Scheme of the Burdwan Farm, 1915-16.

I. Paddy.—(*a*) Aman (*b*) Aus.
II. Jute.—(*a*) Corchorus Capsularis. (*b*) Corchorus Olitorius.
III. Potatoes.
IV. Sugarcane.

I—PADDY.

I.—A. Demonstration.

(*1*) Seed selection of paddy ... 1

Varieties. Jatakalma—Karticksal ...
- I. Selected seeds (farm) ... 1
- II. Non-selected seed from Rajshahi ... ... ⅙
- III. Seed selection by water test (Japanese method)—
  - (1) C. P. fine aus ... ... ⅙
  - (2) Jatakalma—Karticksal ... ⅙
  - (3) Karticksal ... ... ⅙
  - (4) Bansmati ... ... ⅙ } 1
  - (5) Dadkhani ... ... ⅙
  - (6) Badshabhog ... ... ⅙

N. B.—These seeds will be kept for farm use (1916)

(2) Manurial Demonstration.

Jatakalma—Karticksal ... ... *versus* Ears.—Selection for seed supply ...

I. (*a*) 60 mds. (farm cowdung) per acre 2
versus no manure 1½
(*b*) 60 mds. (farm cowdung) per acre ... ½
Versus 60 mds. Raiyats... ... 2
II. Green manure with dhaincha ... 1½
versus no manure 1½
III. Bonemeal, 3 mds. and saltpetre 1 md. per acre 3

(3) Method of cultivation Demonstration.

(*a*) Treatment of 'aus' as aman paddy .. ⅓
Versus aus growing in ordinary way ... ⅓

Variety, Basmati, 50 mds., cowdung per acre ... ...
(*b*) Plough demonstration { I. Meston ... ½ ; II. Hindusthan ⅓
Versus local ... ... ⅓

Jatakalma—Karticksal ... ...
(*c*) Rotation—Aman paddy after jute ... 2
Manure—Cowdung 100 mds. Nitrate of soda 1 md. } per acre.

Paddy—

I.—B. Experiment (1) Variety. (2) Manure.

(1) (*a*) Early varieties { I. C. P. fine aus ... ... ; II. Karticksal... ... ... ; III. Jatakalma-Karticksal ... } ¼
(*b*) Later varieties { I. Dadkhani ... ... ; II. Badshabhog ... ... ; III. Basmati ... ... } ¼

(2) Manure per acre—

(*a*) 60 mds. cowdung ... ...
(*b*) Ditto 1 md. saltpetre ... ...
(*c*) Ditto 1 md. sulphate of ammonia ... ...
(*d*) Ditto 1 md. nitrate of soda ... .
(*e*) Ditto 6 mds. castor-cake ... ... } 1½
(*f*) Bonemeal, 3 mds. and 1 md. nitrate of soda ... ...
(*g*) Ditto 1 md. saltpetre ... ...
(*h*) Ditto 1 md. sulphate of ammonia ... ..
(*i*) No manure ... ...

II.—JUTE.

(1) Low-lands—in rotation with paddy ... 1·98

Corchorus Capsularis { (*a*) Jute after collection of seed ... ; (*b*) „ before the formation of pods ... ; (*c*) „ before flowering ... ... } ·69

(2) High-Lands—in rotation with potatoes ... 1·20

Corchorus Olitorius { (*a*) Jute after collection of seed ... ; (*b*) „ before formation of pods ... ; (*c*) „ before flowering ... ... }

(3) Finlow's: Jute ... ... } ·48
versus.
Red Deshi (Corchorus Olitorius) ... ... }

Manure:—100 maunds cowdung and nitrate of soda 1 maund per acre.

III.—Potatoes.

(*a*) Imported seeds of Darjeeling ... ... ·38
(*b*) Ditto ditto Naini Tal ... ... ·33
(*c*) Local Katni ... ... ·35
(*d*) Do. Deshi *Thickra* of ... ... ·16

			Mds.	
Manures ... Half each	Cowdung		300	per acre.
	Super		3	
	Sulphate of ammonia ...		2	
Ditto ... Ditto ...	Cowdung		300	
	Castor cake		21	

IV.—Sugarcane.

(1) *Demonstration (Ratooning).*

(*a*) Variety Java (White Tanna)	1·12
Ditto Khari	·39

(1) *Demonstration (b) New crops (Varieties recommended).*

I.—White Tanna	·68
II.—Khari	·34
versus.	
Samshara and Puri (Local)	·17

(1) *Demonstration will also be carried on.*

Gur making system as well as seed cutting supply.

(2) *Experiment (Variety).*

(1) Java seedling, (2) White Tanna, (3) Yellow Tanna, (4) Striped Tanna, (5) Puri, (6) Red Mauritius, (7) Khari, (8) B. 147, (9) B. 3412, (10) B. 208, (11) Samshara, (12) Kajla, (13) Red Bombai, (14) Bansta, (15) Rani Bhola	·18

ABSTRACT.

I.—Paddy	19·83
II—Jute	4·35
III.—Potatoes	1·22
IV.—Sugarcane—New	1·37
Ratoon	1·51
Total ...	28·28 acres.

JOGENDRA CH. DE,

Supdt., Agricultural Station, Burdwan.

Agricultural Exhibitions.

The following table gives details of all *melas* supported by this Department in the two Divisions of Western Bengal:—

Agricultural Exhibitions—1915.

Serial No.	NAME OF EXHIBITION.	Date.	Grant allowed.	What demonstrations given.	Name of officer who attended.
			Rs.		
1	Suri Cattle and Produce show.	30th January to 4th February 1915.	300	Irrigation by pumps and dons, gur-making and ploughing.	1st Deputy Director of Agriculture and Superintendent of Agriculture, Burdwan Division.

Serial No.	Name of Exhibition.	Date.	Grant allowed.	What demonstrations given.	Name of officer who attended.
			Rs.		
2	Banjetia Industrial and Agricultural Exhibition.	1st February 1915.	300	Irrigation by pumps and dons, gur-making and ploughing.	1st Deputy Director of Agriculture and Superintendent of Agriculture, Presidency Division.
3	Sekeddah *Mela* ...	7th to 13th January 1915.	Nil.	Seeds, manures and implements recommended by the Department	Superintendent of Agriculture, Burdwan Division.
4	Meherpur Exhibition.	29th January to 4th February 1915.	200	Irrigation by pumps, gur-making and ploughing.	1st Deputy Director of Agriculture and Superintendent, Seedstore.
5	Serampore Art and Agricultural Exhibition.	10th February 1915.	Nil.	Ditto, magic lantern.	Superintendent of Agriculture, Burdwan Division.

Ufra Work at Comilla.

An elaborate programme of work was arranged in connection with Ufra at the foot of the Lalmai Hills near Comilla. The essential points about this work were that land was chosen in the affected area and in such a situation that we could control the water-supply, *i.e.*, prevent the disease from being washed into our plots. It is hoped by this means that we can devise some remedy against the pest. Unfortunately the rainfall was so deficient that the crop on our plots either failed or partially failed, with the result that no definite results were obtained. In a normal year there is more water than is required, so no arrangements had been made for artificial irrigation. This work will be continued.

Demonstration Work.

Demonstration work in the Burdwan and Presidency Divisions is now being taken up more seriously. In a way this work has been in progress for the past ten years, but a study of all the work in the field and in office reveals how inadequate has been the supervision. In nearly every district there are a few earnest persons who only require the requisite advice to do some piece of work.

F. Smith.

Deputy Director of Agriculture, Bengal.

Central Seed Store, Sibpur.

This store remained the chief source of supply for the whole Province during the larger part of the period under review.

With the exception of potatoes, which were supplied chiefly from Darjeeling and from a separate fund, most seeds, manures and implements were sent out from Sibpur.

Towards the end of the year separate seed stores were opened in each division under the respective Superintendents of Agriculture, and Sibpur became the seed store for the Burdwan Division. Since then, however, a new seed store for the Burdwan Division has been opened in the neighbourhood of the Howrah Station.

The following seeds, manures and implements were distributed from Sibpur during the year:—

	Mds.	
Seeds	464½	
Potatoes	120	
Manures	1,152½	chiefly bonemeal.
Implements	29	

The following expenditure and receipts were made during the period under review:—

Receipts.

	Rs.	A.	P.
Remitted to treasury	3,060	12	0
Bills outstanding ...	2,468	4	9
Total ...	5,529	0	9

Expenditure.

	Rs.	A.	P.
Seeds, manures and implements ...	5,109	2	0
Office contingencies	778	14	0
Establishment ...	2,249	1	4
Total ...	8,137	1	4

Mr. D. N. Mittra had charge from July, 1st, to October, 22nd, when Mr. P. G. Krishnan took control, until the seed store was made over to the Superintendent of Agriculture for the Burdwan Division.

F. SMITH,

Deputy Director of Agriculture, Bengal.

From the following data of officers with the dates of appointment we cannot expect much in the way of results from demonstration work in 1914-15, but next year something more definite should be forthcoming:—

Mr. H. P. Mitter, Superintendent of Agriculture, Presidency Division ... 21st August 1914.
Mr. J. N. Sircar, Superintendent of Agriculture, Burdwan Division ... 24th June 1914.
Babu Sachindra Krishna Dutt, District Agricultural Officer, Presidency Division ... 18th March 1915.
Mr. P. G. Krishnan, District Agricultural Officer, Midnapore ... ... 15th May 1915.
Babu Hara Kumar Guha, District Agricultural Officer, Burdwan ... ... 6th January 1915.

Below, I give the Annual Report of each Superintendent of Agriculture:—

F, SMITH,

Deputy Director of Agriculture, Bengal.

Calcutta, the 29th July 1915.

From—The Superintendent of Agriculture, Presidency Division,
To—The Director of Agriculture, Bengal, (through the 1st Deputy Director of Agriculture, Bengal).

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, PRESIDENCY DIVISION, FOR 1914-15.

THIS report deals with the period from 1st July 1914 to 30th June 1915.

I spent 121 days on tour, out of which 12 days were spent outside the Division and the remaining 109 days in the five districts of the Division as follows :—

24-Parganas	... 17 days.	Murshidabad	... 39 days.
Jessore ...	... 32 ,,	Rangpur-Dacca	... 8 ,,
Khulna	... 2 ,,	Chinsura	... 4 ,,
Nadia ...	... 19 ,,		

During the year under report I had to work single-handed till March 1915, when the services of Babu Sachindra Krishna Dutt, travelling inspector, were placed at my disposal. I had four demonstrators only till March, when three more joined me. Thus at present I have got one inspector and seven demonstrators to help me.

In the several agricultural associations in this Division the members with a few exceptions did not do any useful work. The results obtained such as they were are annexed herewith.

Exhibitions.—Exhibitions took place in the following places :—

(*i*) Banje ia ... ... 1st to 7th February 1915.
(*ii*) Keserpahar ... ... 30th January 1915.
(*iii*) Meherpur ... ... 29th January to 4th February 1915.

Demonstrations in *gûr*-making and in the use of the chain pump and *dône* were given during the show.

Annexed herewith is a list of demonstration plots started this year.

eed store.—For the convenience of the public a seed-store has been opened since at 27, Upper C rcular Road, Calcutta (opposite Sealdah Railway Station), where seeds, manures and implements are stocked. The following have been distributed from the seed-store :—

	Mds. s.		Mds. s.
Bonemeal	... 82 10	Superphosphate	... 0 26
Dhaincha	... 2 20	Chili saltpetre	... 0 25
Wheat ...	... 1 1	Sulphate of ammonia	0 10
Rahar seed	... 0 3	Sulphate of potash	... 0 1½
Groundnut	... 0 15		

Results of demonstration work carried out by members of Agricultural Associations in 1914-15.

Name.	Address.	Nature of demonstration.	Area.	Outturn per acre.
Babu Surendra Nath Ghose	Rajibpur (24-Parganas).	Introduction of Patna potato.	7½ cottahs	186 maunds.
		Introduction of Australian potato.	2½ ,,	168 ,,
		Effect of bonemeal on *aman* paddy (Benaphul).	2½ bighas	25 ,,
		Unmanured plot ...	2 ,,	16 ,,
,, Raman Krishna Dutt	Chandipur, Kagdwip (24-Parganas).	Introduction of Darjeeling potato.	10 cottahs	120 ,,
,, Jitendra Nath Bose	Jamalpur (24-Parganas).	Effect of green manuring with dhaincha on *aman* (Patna) paddy.	10 ,,	24 ,,
		100 maunds of cowdung on *aman* paddy.	10 ,,	18 ,,
		Samudrabali paddy. Effect of bonemeal with saltpetre.	12 ,,	30
		Dhaincha	12 ,,	25½ ,,
		Patna potato	10 ,,	195 ,,
,, Sukumar Adhikary ...	Murshidabad ...	Darjeeling potato ...	2 ,,	140 ,,
,, Debendra N. Mukherji	Ditto ...	Tank silt 20 maunds per bigha on gram.	1 bigha	13 ,,
		Without manure ...	1 ,,	10 ,,
,, Prasanna Nath De ...	Kasimbazar ...	Introduction of Mauritius sugarcane.	15 cottahs	2 400 canes per bigha.
,, Rash Behari Dutt ...	Choto Jagulia (24-Parganas).	Introduction of Darjeeling potatoes.	22 cottahs	240 maunds.*

* Manured with preserved cowdung in pits and castor-cake.

List of demonstrations started in 1915 the results of which will be noted in next year's report.

1.	Babu Surendra Nath Ghosh.	Rajibpur (24-Parganas).	Effect of bonemeal on *aus* paddy. Effect of castor-cake on *aus* paddy. Effect of bonemeal on *aman* paddy. Effect of castor-cake on *aman* paddy. Effect of castor-cake on jute. Effect of Chili saltpetre and superphosphate on jute. Introduction of Mr. Finlow's jute. Introduction of groundnut.
2.	Babu Jitendra Nath Bose.	Jamalpur (24-Parganas).	Same as that of Babu Surendra Nath Ghosh.
3.	Babu Tarakdas Banerji.	Ghoshpur (24-Parganas.).	Ditto.
4.	Babu Surendra Nath Ghosh.	Murrel, Jessore ...	Ditto.
5.	Mr. E. G. McLeod ...	Kotchandpur, Jessore.	Ditto and green manuring with dhaincha on *aman* paddy.
6.	Babu Joyhari Bose ...	Damurhuda, Nadia	Same as that of Mr. E. G. McLeod.
7.	Babu Ramanath Rai	Hardi, Nadia ...	Ditto.
8.	Maulvi Jairuddin Biswas.	Chuadanga ...	Effect of bonemeal on *aus* paddy.
9.	Babu Harendra Nath Ballav.	Dhankuria (24-Parganas).	Effect of bonemeal and dhaincha on *aman* paddy.
10.	Babu Bhutnath Safai	Kalyanpur (24-Parganas).	Ditto.
11.	Babu Krishnapada Maitra.	Malancha (24-Parganas).	Ditto.
12.	Babu Tarini Charan Naskar.	Budge-Budge ...	Effect of bonemeal on *aman* paddy.
13.	Babu Trailakhya Nath Chatterji.	Ghathbog, Khulna	Ditto.
14.	Babu Bhutnath Laskar.	Champahati (24-Parganas).	Ditto.
15.	Babu Sasi Bhusan Rai	Jangipur (Murshidabad).	Ditto.
16.	Babu Mohendra Narain Chowdhry.	Nimtila (Murshidabad).	Ditto.
17.	Babu Nilmani Bhattacharya.	Berhampur ...	Effect of bonemeal on *aman* paddy and introduction of sugarcane (B. 147).
18.	Babu Prasanna Nath De.	Kasimbazar ...	Bonemeal and sugarcane (B. 147).

Seed rates of principal crops in Presidency Division.

		Per acre.
Aus paddy	Broadcasted ...	30 seers.
	Transplanted ...	20 ,,
Aman paddy	Broadcasted ...	30 ,,
	Transplanted ...	20 ,,
Boro paddy—Transplanted	...	25 ,,
Jute	...	4½ ,,
Mesta (Deccan hemp)	...	4½ ,,
Wheat	...	1 maund.
Khesari or Teora	...	20 seers.
Gram	...	1 maund.
Lentils	...	25 seers.
Mung	...	10 ,,
Mashkalai (urid)	...	5 ,,
Arhar	...	6 ,,
Gingelly	...	10 ,,
Linseed	...	10 ,,
Niger (Surguja)	...	20 ,,
Rape, mustard	...	5 ,,
Sunn-hemp	...	1 maund.
Tobacco	...	1 ounce.
Chillies	...	1 seer.

H. P. MITRA,

Supdt. of Agriculture, Presidency Division.

Dated Chinsura, the 6th July 1915.

From—The Superintendent of Agriculture, Burdwan Division,
To—The Director of Agriculture, Bengal (through the 1st Deputy Director of Agriculture, Bengal).

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, BURDWAN DIVISION, 1914-15.

Staff.—Formerly there was an Inspector for this Division; and his main duty was to keep connection in matters agricultural with various Agricultural Associations and their members in the Division. He used to see the members and tried to carry out demonstration work in the lands of a few who took special interest in it.

Since 24th June 1914, there is no longer any Inspector. A Superintendent has been appointed for the Division and the nature of his duty is changed to a considerable extent. Demonstration work is being carried out as in East Bengal in the plots of raiyats whether he is a member or not.

Three Demonstrators were appointed at the beginning and two at the end of the year under report. Since the middle of the year I received a District Agricultural Officer with head-quarters at Burdwan. In may last I received another District Agricultural Officer with his head-quarters at Midnapore.

Agricultural Associations.—There are one Divisional and five District Agricultural Associations in the Division. With the exception of Howrah, every district of the Division has got an Association. The Divisional Commissioner is the President of the Divisional Association, and the Collectors of Districts are Presidents of their respective District Associations. Besides the above six Associations, there are three branch Agricultural Associations at Rampurhat, Katwa, and Contai. Every Association has generally got 20—30 members.

There were altogether 20 meetings of the Associations in the year under report; I could attend 18 of them. It was not possible for me to attend the remaining two as they clashed with other two meetings.

Exhibitions and Fairs.—There were altogether six exhibitions and fairs in the year. I attended all of them. The Suri and Burdwan Exhibitions

proved to be the best of their kind in the Division. The Suri Exhibition lasted for six days and the Burdwan one for three days. In both the exhibitions departmental seeds, manures, tools, etc. were exhibited; lectures and lantern lectures were delivered; and demonstration on improved implements were shown. I beg to take the opportunity here to thank Babu Jogendra Charan De, Superintendent of the Burdwan Farm, who assisted me in arranging the Burdwan Exhibition.

The Burdwan Exhibition was arranged under the auspicies of the Bengal Literary and Scientific Conference. The other exhibitions and fairs were held at Hetempur and Sekedda (Birbhum), Mahata (Burdwan) and Serampore (Hooghly).

Demonstration Work.—I was out on tour for 241 days in the year under report for Departmental work—specially for demonstration work.

There was practically no officer in charge of agricultural work in this division from April to June 1914, and this period is the important time for arranging demonstration work, consequently there is scarcely any important demonstration work in the first half of the year which can be mentioned here with definite result. But in the latter half, vigorous attempt was made to make demonstration work popular among the people. I am glad to report that our success is rather splendid in this respect. Our appeal was responded to promptly by many.

The works undertaken in various districts of the Division are—

(1) Bonemeal on paddy.
(2) Castor cake on paddy.
(3) Green manuring with dhaincha.
(4) Introduction of groundnut.
(5) Introduction of superior varieties of sugarcanes.
(6) Introduction of superior varieties of potatoes.
(7) Introduction of Kakya Bombai jute.
(8) Conservation of cowdung.
(9) Introduction of Meston plough, Planet Junior Hand Hoe, Chain-pump and done.

Bonemeal.—The people seem to be very conservative; but yet about 500 maunds of bonemeal have been distributed under my supervision among rayats for the cultivation of paddy in nearly 500 bighas of land. It is an important rice-growing division, and the transplanting process is prevalent everywhere.

Castor Cake.—The application of castor cake is not a new practice at all in this division. It is a general manure here for the cultivation of potato and sugarcane. In many places cultivators apply 30 maunds of castor cake to an acre. But this year we are trying to see its effect on paddy. Nearly 125 maunds have been distributed, and this will suffice for 100 bighas.

Green Manuring with Dhaincha.—It is appreciated by the people of this division so much that the total stock of over 45 maunds of seeds, sufficient for manuring 700 bighas, have been exhausted in a very short period. The seeds have been arranged for sowing under our supervision.

Sugarcane.—It is an important crop of this division. There are seven local varieties. It was proved by demonstration work in the Burdwan farm as well as in the private farms of Babus Raghunath Banerjee and Basanta Kumar Mitter that foreign cane specially "tanna" did excellently well in the soil of this division. A good many people were eager to introduce this foreign cane in their lands. All the cuttings available of this variety and cuttings of some other varieties as well, aggregating about 1,00,000 (one lac) have been distributed by us. They have been planted according to our instruction and they are doing well.

Potato.—It is rather everybody's field crop now-a-days in this division. Serampore subdivision may be mentioned as the centre of potato growing tract. Sheoraphuli bazar can supply in any *hât* day in the season thousands of maunds of locally grown potatoes. Patnai, Naini Tal, Cawnpuri and Darjeeling potatoes are generally grown. Italian and English seeds have also been tried this year.

Owing to scarcity of rain in the autumn—the proper season of potato-cultivation—the outturn per acre could scarcely be found exceeding 240 maunds.

Jute.—Olitorius variety of jute is generally grown in this division. Capsularis is also being favourably received by the raiyats now-a-days. We are trying it this year in our demonstration plots in the districts of Hooghly and Burdwan.

Conservation of Cowdung.—Many people of this division understand the utility of conserved cowdung. In hundreds of places I personally noticed that cowdung was scientifically reserved in pits under trees. It is rather becoming a common practice among the cultivators of all the districts of this division.

Meston Plough and Planet Junior Hand Hoe.—They do not work satisfactorily in the hard soil of Birbhum and Bankura; but they are being favourably received for their application in alluvial and sandy soil of the the Damodar valleys.

Done.—It is proved to be the best and most popular apparatus for irrigating land where the water-level is not lower than 8 or 10 feet. Chain pump is also being introduced among the agriculturists. The Raja of Narajole (Midnapore) has installed two bullock-gear-double-chain-pumps in his two demonstration farms this year. They are working quite satisfactorily.

Disease.—Paddy, jute and cocoanut disease was noticed in the year under report. Possible steps were taken by the Department. The Entomological and Mycological Collectors from Dacca came to investigate the paddy disease; and assistants to the Imperial Entomologist came down to Uttarpara and Serampere to take specimens and examine the cocoanut disease. The insect pest of jute was stopped by the common practice of drawing a string, dipped into kerosene, over the crop several times.

Private Farms.—Among the private farms inspected by me, the following are noteworthy:—

1. Raja of Narajole's Farm (Midnapore).
2. Babu Basanta Kumar Mitter's Farm, Panesheola (Hooghly).
3. Babu Satyendra Ch. Mitter's Farm. Bahara (Burdwan).
4. K. B. Moulvi Samsuzzaha's Farm, Sekedda (Birbhum).
5. Babu Rajaram Mitter's Farm, Gangajalghati (Bankura).

Owing to drought in autumn, the result of demonstration work was not so satisfactory in the year under report. The result of a few, which were to some extent successful, is given in Appendix I.

The list of persons who have earnestly commenced demonstration work in more than 5 bighas each, under our supervision is given in Appendix II. The main crops being tried in their plots are paddy with bonemeal and dhaincha green manuring, potato and sugarcane with castor cake, conserved cowdung and tank silt, and groundnut without any manure.

J. N. SIRKAR,

Supdt. of Agriculture, Burdwan Division.

APPENDIX I.

Serial No.	Nameof persons in whose land demonstration work is carried out.	NAME OF CROP.	Manure used per acre.	Outturn per acre.
				MS. SRS.
1	Babu Rama Prasanna Mukerjee, Kundala.	Naini Tal potato	150 maunds cowdung and 12 maunds castor cake.	240 0
2	„ Mahendra Baul, Baruipara.	Ditto „ ...	18 maunds castor cake and 150 maunds cowdung.	231 0
3	„ Rama Prasanna Mukerjee, Kundala.	Patnai „ ...	150 maunds cowdung and 12 maunds castor cake.	220 0
4	„ Raghu Nath Banerjee, Kalikapur.	Italian „ ...	12 maunds mustard cake and 180 maunds cowdung.	191 10
5	„ Hari Charan Pal, Bale.	Patnai „ ...	120 maunds cowdung and 15 maunds castor cake.	181 20
6	Munshi Baherjan, Joykristopur.	„ „ ...	24 maunds castor cake ...	180 15

APPENDIX I—*concluded.*

Serial No.	Name of persons in whose land demonstration work is carried on.	Name of Crop.	Manure used per acre.	Outturn per acre.
				Ms. srs.
7	Babu Nitya Gopal Singh, Debipur.	Patnai potato	21 maunds castor cake ...	180 0
8	„ Anukul Ch. Saha, Debipur.	„ „ ...	20 „ „ „ ...	176 24
9	„ Hari Charan Pal, Bale.	Naini Tal „ ...	75 maunds cowdung and 18 maunds castor cake.	175 14
10	„ Bhutnath Ghose, Ajhapur.	Patnai „ ...	18 maunds 30 seers castor cake.	157 20
11	„ Raghunath Banerjee, Kalikapur.	„ „ ...	6 maunds mustard cake and 180 maunds cowdung.	147 36
12	„ Radhanath Mandal, Chaurulia.	„ „ ...	200 maunds cowdung ...	150 21
13	„ Raghu Nath Banerjee, Kalikapur.	Sugarcane Tanna	150 maunds cowdung and 10 maunds castor cake.	90 0*
14	„ Ditto ditto ...	„ Khari ...	Ditto ditto ...	60 0*
15	„ Bhutnath Ghosh, Ajhapur.	„ „ ...	100 maunds cowdung, 18 maunds castor cake and 1 maund 32 seers lime.	55 32
16	„ Rama Prasanna Mukerjee, Kundala.	Dadkhani paddy	225 maunds cowdung ...	35 0
17	Dr. Probodh Ch. Chatterji, Dhatrigram.	Aman „	3 „ mustard cake ...	31 20
18	Babu Bhutnath Ghose, Ajhapur.	Dhadkhani „	150 „ cowdung ...	22 20

* Gur.

APPENDIX II.

Serial No.	Name.	Village.	District.
1	Babu Basanta K. Mitter ...	Panesheola ...	Hooghly.
2	„ Abhoyapada Mukerjie ...	Sheakhala ...	Ditto.
3	R. B. Bijoynarain Kundu ...	Itachuna ...	Ditto.
4	Babu Sriram Ch. Bose ...	Boso ...	Ditto
5	„ Mahendra Baul ...	Baruipara ...	Ditto.
6	„ Bipin Behari Sasmal ...	Contai ...	Midnapur.
7	„ Rampada Chatterjee ...	Do. ...	Ditto.
8	Raja of Narajole	Narajole ...	Ditto.
9	Rai Lalit Mohan Singh Rai Bahadur.	Chakdighi ...	Burdwan.
10	Babu Bhutnath Ghose ...	Ajhapur ...	Ditto
11	„ Nitya Gopal Singh ...	Debipur ...	Ditto.
12	„ Anukul Ch. Saha ...	Baledanga ...	Ditto.
13	„ Amrita Lall Shil ...	Satgachia ...	Ditto.
14	Dr. Prabodh Ch. Chatterjee ...	Dhatrigram ...	Burdwan.
15	Babu Purna Ch. Mazumdar ...	Amlazora ...	Ditto.
16	Munshi Khoda Neaz ...	Churulia ...	Ditto.
17	Khan Bahadur Maulvi Samsuzzoha	Sekedda ...	Birbhum.
18	Babu Rama Prasanna Mukerjee	Kundala ...	Ditto.
19	Dr. K. D. Sircar	Nalhati ...	Ditto.
20	Munshi Baherjan	Joykristopur ...	Ditto.
21	„ Alahadad	Shahpur ...	Ditto
22	Babu Bhairab Ch. Banerjee ...	Purandarpur ...	Ditto
23	Maharajkumar S. N. Chakervatty	Hatempur ...	Ditto.

APPENDIX II—*concluded.*

Serial No.	NAME.	Village.	District.
24	Babu Raghunath Banerjee ...	Kalikapur ...	Bankura.
25	„ Harinath Banerjee ...	Ditto ...	Ditto.
26	„ Kali Nath Chatterjee ...	Palashdanga ...	Ditto.
27	Kumar R. N. Chandradhanga ...	Maliara ...	Ditto.
28	Babu Rajaram Mitter ...	Gangajalghati ...	Ditto.
29	Munshi Meherulla	Ashuria ...	Ditto.
30	Babu Banwari Lal Sircar ...	Ditto ...	Ditto.
31	„ Judhisthir Nandy ...	Patpur ...	Ditto.
32	„ Jatindra Nath Bhui ...	Taldangra ...	Ditto.
33	„ Rasik Behari Biswas ...	Vishnupur ...	Ditto

J. N. SIRKAR.

Supdt. of Agriculture, Burdwan Division.

Seed Rates of Principal Crops in the Burdwan Division.

		Per acre.
1.	Paddy	12—16 seers when transplanted.
		9—12 seers when broad cast.
2.	Potato	10—15 mds.
3.	Jute	3 seers.
4.	Sugar-cane ...	12,000—16,000 cuttings.
5.	Kalai	25 seers.
6.	Mustard	5 „
7.	Wheat	20 „
8.	Gram	30 „
9.	Lentil	20 „
10.	Ground-nut ...	30 „
11.	Til	1 „

J. N. SIRKAR.

Supdt. of Agriculture, Burdwan Division.

No. 1075R-4, dated Dacca, the 15th July 1915.

FROM—K. MCLEAN, ESQ., B.SC., 2nd Deputy Director of Agriculture, Bengal,
To—The Director of Agriculture, Bengal.

IN submitting the Annual Reports for the Eastern Circle, I beg to draw your attention to the economic value of the experimental and demonstration works carried out.

The results of the application of bonemeal on the red soil are again conclusive, and it appears to me that sufficient information has been obtained to justify its application on an extended scale.

Land in the Madhupur jungle tract extending to about 500,000 acres would produce good crops if a reclamation scheme were taken in hand. The average yield of paddy on this soil 12 maunds per acre has been raised to 21 maunds ; the cultivator increasing his income from Rs. 36 to Rs. 63, whilst incurring an expenditure of only Rs. 9. If the whole of this tract had been

under paddy, this would mean an additional net income of some Rs. 10,000,000. It will be seen that the opening up of this tract will certainly repay the capital expenditure. There is a quantity of valuable timber at present throughout the tract.

The introduction of potato cultivation is an important demonstration economically.

Certain defined areas are becoming evident as peculiarly suited to this crop and yields as high as 10 tons per acre have been obtained.

The crop has filled a decided want in these areas where the cultivators find that they obtain good returns during a season which produced very little in the past.

The area along the banks of the Meghna river has given the heaviest yields of potatoes, and the cultivators have found the crop most profitable.

The introduction of new varieties of sugarcane is also of high economic importance, and the cultivators are very anxious to obtain cuttings.

The details of the working of the various Farms and Reports of the Divisional Superintendents and the Superintendent, Rangpur district I now beg to submit herewith.

I took over charge of the Eastern Circle from Mr. Smith, 1st Deputy Director of Agriculture, on the 29th January 1915, and since that time I have been 99 days on tour.

KENNETH McLEAN,

2nd Deputy Director of Agriculture Bengal.

ANNUAL REPORT OF THE DACCA CENTRAL EXPERIMENTAL STATION FOR THE YEAR 1914-15.

THE Dacca Central Experimental Station is situated five miles north of Dacca Railway Station near the village Manipur.

The land was acquired by the Eastern Bengal and Assam Government in 1906. The highland area is intersected by ravines which are suited for Aman paddy. Unfortunately owing to the narrowness of these ravines and the ensuing "wash" their fertility is very uneven and makes experimental work difficult.

The highland soil is typical of the laterite tract known as the Madhupur jungle. In dry weather it becomes uncultivatable, setting like brick, but a few showers of rain loosen the soil, and cultivating operations have to be accelerated to get over the land whilst it is in this condition.

With country ploughs this was impossible owing to the limited supply of bullocks. The Turn Wrest ploughs although they do three times the area covered with a country plough require two pairs of bullocks, so the advantage gained is limited. Panjab ploughs have now been introduced, they can easily do three times the work of the country plough, ploughing 6" deep with one pair of bullocks and one man.

The same difficulties arose in the succeeding cultivations which were also done with the country plough. The five tined Spring Toothed Harrow has obviated this prolonged period of cultivation.

The land became very dirty but there is a tremendous improvement due to these implements and to the ordinary zigzag harrow which has also been introduced this year.

Labour conditions in Eastern Bengal are exceptional, raiyats paying as high as Re. 1-8 per day to up-country men to weed their jute. When the labour value is compared with American and European labour it will be seen that the problem of reducing expenses by the introduction of improved implements is as important in Eastern Bengal as it is there.

The Farm Mistries have constructed a paddy seed drill which is promising and being made out of local materials is inexpensive.

The results of this year's working will give a comparison between drilled and broadcasted aus paddy.

The Meston plough has been widely distributed throughout the province and experiments are now being carried out on this Farm to make it into a more useful implement.

A "Small Holding" Thrasher has been purchased but it has not yet been tested. The Farm Mistries will be able to carry out any improvements on the machine, as they become evident.

One of the most expensive items is the cost of jungle clearing and in the current year experiments will be tried in utilizing the roadsides for cropping. In this way it is hoped that some return will be obtained for the outlay which at present is non-productive.

Some 25 acres of jungle land will be brought under cultivation this year. The Burra Tak area is one of the richest on the Farm and with liming should give very good crops.

Definite areas are now allocated to each Overseer. Previously there was a tendency to avoid responsibility as each item of cultivation was carried out under different supervision.

At present there is no drainage system of any material value. It is contemplated during the current year to have the whole Farm properly drained. Owing to the numerous bydes or ravines a drainage scheme will not be costly.

Area and general features—

High-land	...	283	acres
Low-land	...	70·7	„
		353·7	„

One hundred and forty-one acres of the high-land were under cultivation during the year under report, the remainder being allocated to roads, buildings, Botanical area, mangoe groves, tanks, and jungle. All the low-land is cultivated.

Irrigation.—The potato crop is the only one which is irrigated.

Rainfall.—The following table indicated the rainfall returns in comparison with the normal :—

Name of months.	Number of rainy days.	Rainfall at farm, in inches.	Normal in Sadar.	
			Rainfall, in inches.	Days.
April 1914 ...	18	8·73	4·88	6·7
May „ ...	13	15·05	9·6	11·3
June „ ...	16	4·32	13·38	15·2
July „ ...	27	15·75	12·85	17·5
August „ ...	23	11·33	12·53	17·40
September „ ...	13	7·96	9·43	11·70
October „ ...	4	2·27	*Nil*	*Nil*
November „ ...	*Nil*	*Nil*	„	„
December „ ...	3	1·27	„	„
January 1915 ...	3	0·56	„	„
February „ ...	1	1·23	1·12	1·8
March „ ...	2	0·22	2·59	3·5

The maximum and minimum temparature as recorded in the farm are as follows:—

Name of months.			Office.		Verandah.		Godown.	
			Maximum.	Minimum	Maximum.	Minimum.	Maximum.	Minimum.
April	1914	...	89·10	74·43	72·43	56·50	91·70	78·30
May	,,	...	90·60	80·10	92·70	77·22	94·00	77·37
June	,,	...	91·33	82·20	93·43	79·53	95·00	79·63
July	,,	...	88·32	82·09	88·77	79·61	91·29	80·32
August	,,	...	89·48	84·00	89·48	80·16	83·09	80·19
September	,,	...	90·76	81·86	91·70	79·33	91·13	79·00
October	,,	...	95·25	76·55	93·85	72·48	91·81	72·14
November	,,	...	87·90	69·73	89·03	64·83	89·23	64·83
December	,,	...	82·61	63·13	66·00	59·26	83·51	59·42
January	1915	...	81·32	63·09	82·67	59·19	80·71	57·58
February	,,	...	80·07	58·71	79·82	58·50	79·13	58·13
March	,,	...	93·45	60·97	95·87	62·97	101·55	63·51

Farm operations.—These are divided into the following heads:—

1. Experimental cultivation.
2. Non-experimental cultivation.
3. Reclamation.
4. Construction and petty repairs.
5. Distribution of seeds.
6. Poultry keeping.
7. Training of apprentices.

Experimental operations.—Mr. Birt's high-land improvement experiment in north Hazi.

There are four blocks each one acre in extent. The size of each plot is $\frac{1}{4}$ acre and that of sub plots $\frac{1}{16}$ acre.

The manuring is as follows:—

Plot No. 1 ... No manure.
,, No. 2 ... Slaked lime 10 mds. per acre.
,, No. 3 ... Slaked lime 50 mds. per acre applied in 1911, 1914, 1917.
,, No. 4 ... Slaked lime 60 mds. per acre applied in 1911 and 1917.

Cross-dressing—

Section *a* ... No manure.
,, *b* ... Bonemeal 3 mds. per acre.
,, *c* ... 3 mds. bonemeal per acre and 100 mds. cowdung.
,, *d* .. Cowdung 100 mds. per acre annually.

CROPPING FOR FIRST SIX YEARS.

Blocks A and D.

		Kharif.	Rabi.
1st year	1911	... Dhaincha green manure ...	Mustard.
2nd „	1912	... Aus paddy	Matikalai.
3rd „	1913	... Dhaincha green manure ...	Mustard.
4th „	1914	... Aus paddy	Matikalai.
5th „	1915	... Dhaincha green manure ...	Mustard.
6th „	1916	... Aus paddy	Matikalai.

BLOCKS B AND C.

		Kharif.	Rabi.
1st year	1911	... Aus paddy	Mustard.
2nd „	1912	... Ditto	Matikalai.
3rd „	1913	... Ditto	Mustard.
4th „	1914	... Ditto	Matikalai.
5th „	1915	... Ditto	Mustard.
6th „	1916	... Ditto	Matikalai.

The results obtained in 1914-15 are shown in the attached plan.

Mr. Basu's high land improvement experiment by green-manuring and liming, etc.

The results obtained are as follows :—

In the year 1914-15 the western half of the plot was manured with bonemeal, and the eastern half was left unmanured.

Serial No.	Bonemeal manured or unmanured.	Name of crops with variety.	Area in acres	Actual outturn.			Outturn per acre.		
				Mds.	srs.	ch.	Mds.	srs.	ch.
1	Manured ...	Plot No. 2A Aus paddy (larcose).	·25	2	5	0	8	20	0
2	Ditto ...	Do. 1A Ditto	·25	1	22	0	6	8	0
3	Ditto ...	Do. 2B Ditto	·25	3	21	8	14	6	0
4	Ditto ...	Do. 1B Ditto	·25	4	9	8	16	38	0
5	Ditto ...	Do. 2C Ditto	·25	3	36	0	15	24	0
6	Ditto ...	Do. 1C Ditto	·25	2	29	0	10	36	0
7	Ditto ...	Do. 2D Ditto	·25	2	18	0	9	32	0
8	Ditto ...	Do. 1D Ditto	·25	1	29	12	6	39	0
9	Unmanured	Do. 2A Ditto	·25	1	10	0	5	0	0
10	Ditto ...	Do. 1A Ditto	·25	1	21	8	6	6	0
11	Ditto ...	Do. 2B Ditto	·25	3	19	0	13	36	0
12	Ditto ...	Do. 1B Ditto	·25	3	31	0	15	4	0
13	Ditto ...	Do. 2C Ditto	·25	3	13	4	13	13	0
14	Ditto ...	Do. 1C Ditto	·25	2	35	0	11	20	0
15	Ditto ...	Do. 2D Ditto	·25	1	27	4	6	29	0
16	Ditto ...	Do. 1D Ditto	·25	2	23	0	10	12	0

The following experiments were done in connection with aus paddy.

1. *Variety.*—Varieties—Pooki; Larcose; Gorfa; Surjamukhi.—The following results were obtained :—

Serial No.	Name of variety.	Reference number of maps.	Area in acres.	Actual outturn.	Outturn per acre.
				Mds. srs. ch.	Mds. srs. ch.
1	Pooki ...	S. Hazi ...	2	26 23 8	13 11 12
2	Larcose ...	Do. ...	2	40 30 8	20 15 4
3	Gorfa ...	Do. ...	2	32 39 12	16 19 14
4	Surjamukhi ...	Do. ...	2	37 25 4	18 32 10

2. *Manurial.*—Varieties—Larcose. Each plot was separated by a check plot and the following results have been obtained :—

Serial No.	Manure applied.	Number of plot.	Area in acres of plot.	Actual outturn—average of duplicates.	Outturn per acre.
				Mds. srs. ch.	Mds. srs. ch.
1	Nil ...	3/a, 5/a, 3/b, 4/b, 5/b, 6/b, 3/d, 4/d, 5/d, 6/d,	$\frac{1}{8}$ acre each	3 3 $7\frac{2}{3}$	15 17 5 (average ten plots).
2	Cowdung 50 maunds per acre.	3/c, 5/c.	Ditto	3 28 2	18 20 10
3	Bonemeal 3 maunds per acre.	3/c, 5/c,	Ditto	4 20 2	22 20 10
4	Cowdung 50 maunds and Bonemeal 3 maunds per acre.	4/a, 6/a	Ditto	4 5 2	20 25 10
5	Cowdung 50 maunds. Bonemeal 3 maunds. Lime 5 maunds per acre.	4/c, 6/c	Ditto	4 5 14	20 29 6
6	Cowdung 50 maunds and Lime 5 maunds per acre.	4/c, 6/c	Ditto	3 18 12	17 13 12

The following experiments on the methods of cultivation were conducted :—

(A) On seed rate :—Variety—Surjamukhi aus paddy.
The result is as follows :—Seed was broad-casted.

Serial. No.	Kind of seed raised.	Seed rate per acre.	Area in acres.	Actual outturn.	Outturn per acre.
				Mds. srs. ch.	Mds. srs. ch.
1	Seed that sinks in saturated solution of salt.	½ md.	1	13 12 8	13 12 8
2	Ditto ...	1 ,,	1	18 20 4	18 20 4

(B) Rotation experiment :—

(*i*) In low-land—

(*a*) Aus followed by aman ...	Bonemeal ...	3 maunds.
(*b*) Jute „	Ditto ...	3 ..
	Lime ...	3 ..
(*c*) „	Cowdung ...	100 ..

(*ii*) In high-land—

(*a*) *Aus* followed by niger.
(*b*) .. .. .. til.
(*c*) .. .. .. matikalai.
(*d*) .. .. .. mustard.
(*e*) .. .. .. matikalai.

Matikalai green manure and then mustard.

The results of the above experiment are given below in a tabular form—

Serial No.	Reference number of maps.	Area of the plot—nature of experiment in acre.	Kind of crop.	Actual outturn.	Outturn per acre.
1	Shunti Low 14, 18, 20.	1 Aus followed by aman ...	Aus ...	6-37-0	6-37-0
			Aman (malati).	18-7-8	18-7-8
2	Shunti Low 15, 19, 20.	1 Jute followed by aman ...	Jute ...	ploughed up	
			Aman ...	20-18-0	20-18-0
3	Mastul Low ...	1 Jute followed by aman ...	Jute ...	6-31-0	6-31-0
			Aman (malati).	20-23-8	20-23-8
4	Office field ...	1 Aus followed by niger ...	Aus (Boaljuri).	12-13-0	12-13-0
			Niger ...	0-37-4	0-37-4
5	Ditto ...	1 Aus followed by til ...	Aus (Boajuri).	11-13-12	11-13-12
			Til ...	0-13-0	0-13-0
6	Ditto ...	1 Aus followed by matikalai ...	Aus (Boaljuri).	14-22-7	14-22-7
			Matikalai	0-38-0	0-38-0
7	Ditto ...	1 Aus followed by mustard ...	Aus (Boaljuri).	12-26-8	12-26-8
			Mustard ...	0-26-0	0-26-0
8	Ditto ...	1 Aus followed by Matikalai green manure and then mustard.	Aus (Boaljuri).	13-0-4	13-0-4
			Mustard ...	0-17-8	0-17-8

Winter rice—The following experiments were carried on winter rice.

(A) Varietal.—Nine varieties were taken and experiments were conducted in two different ravines.

The results obtained from each ravine are given separately :—

Office Ravine.

Serial No.	Variety of paddy.	Area in acres.	Outturn actual.	Outturn per acre.
			Mds. sr. ch.	Mds. sr. ch.
1	Kataribhog	·41	11 30 4	28 8 10
2	Badshabhog	·53	11 27 0	21 35 10
3	Dadkhani	·36	9 0 0	24 21 13
4	Chinigurah	·48	11 8 0	23 6 14
5	Lohadung	·46	8 30 0	18 30 0
6	Indursail	·46	16 23 8	35 21 12
7	Lamba Chikan	·41	12 25 8	30 13 5
8	Lal Balam	·60	16 4 0	26 33 5
9	Maloty	·50	18 9 0	36 18 0

Rakhali Byde.

1	Kataribhog .,. ...	·50	4 9 8	8 19 0
2	Lohadung	·55	10 22 0	19 7 4
3	Badshabhog	·43	7 4 0	16 20 8
4	Dadkhani	·43	9 2 0	21 1 14
5	Indursail	·41	8 27 0	21 5 6
6	Lamba Chikan	·45	8 34 8	19 27 14
7	Maloty	·66	17 7 8	25 30 4
8	Chinigurah	·36	12 33 0	35 25 0
9	Lalbalam	·28	6 37 0	24 29 4

Though Chinigurah gave the highest result in this byde, Indursail paddy of Economic Botanist occupied the first place among all the paddies in the farm.

Manurial experiment with Aman paddy.—The results obtained as tabulated below :—

VARIETY MALOTY.

Results of the Khoskhana Ravine manurial experiment for the year 1914-15.

Serial No.	No. of plots.	Area in acres.	Manure.	Outturn in plot.	Outturn per acre.	Average of duplicates.
				Mds. s. c.	Mds. s. c.	Mds. s. c.
1	7, 8	0·240	Unmanured	6 35 0	28 25 13	26 11 ½
2	33	0·263	Ditto	6 11 8	23 36 4	
3	14, 15	0·229	Dhaincha green manure ...	7 23 8	33 5 6	28 9 11½
4	25, 27	0·182	Ditto ...	4 10 0	23 14 1	
5	17, 19	0·196	Dhaincha green manure and lime 5 maunds.	5 16 0	27 22 0	27 1 13
6	26, 30	0·227	Ditto ...	6 1 0	26 21 10	
7	16	0·189	Dhaincha green manure and bonemeal 3 maunds.	6 2 8	30 27 3	29 38 14
8	24, 28	0·205	Ditto ...	6 0 0	29 10 9	
9	20	0·259	Dhaincha green manure lime, 5 maunds per acre, bonemeal 3 maunds.	7 39 8	30 33 9	29 36 ½
10	21, 22	0·265	Ditto ...	7 27 0	28 38 8	
11	29	0·208	Bonemeal 3 maunds ...	7 26 8	36 33 8	33 0 14½
12	13, 18	0·199	Ditto ...	5 32 8	29 8 5	
13	32	0·300	Cowdung 50 maunds ...	8 34 8	29 28 0	28 4 15
14	9, 11	0·246	Ditto	6 21 4	26 21 14	
15	31	0·310	Cowdung 50 maunds and bonemeal 3 maunds.	7 29 8	24 38 6	26 32 8½
16	10, 12	0·242	Ditto ...	6 37 8	28 26 11	

The above figures show distinctly the high value of bonemeal.

1. *On the method of cultivation.*—Period of ploughing experiment—

Plot A was ploughed up immediately after harvesting.
Plot B was ploughed in April and May 1915.

Serial No.	Nature of Plot.	Area in acres.	Reference number of maps.	Actual outturn.	Outturn per acre.
				Md. S. C.	Md. S. C.
1	A ...	1	Shunti low plots, 3, 9, 12.	19 19 0	19 19 0
2	B ...	1	Shunti low plots, 4, 8, 13.	19 11 4	19 11 4

2. Local plough *versus* Meston plough. This was carried out in low land with Lohadung paddy.

Serial No.	Kind of plough.	Area in acre.	Reference No. of maps.	Actual outturn.
				Md. Sr. Ch.
1	Meston ...	1	Agergaon low	20 28 8
2	Local ...	1	Ditto ...	20 13 8

Spacing and Seedling experiments.—The variety Lohadung was taken and the following results were obtained :—

Serial No.	Nature of experiment.	Time of transplanting.	Reference number of maps.	Plot number.	Area in acres.	Outturn per plot.	Outturn per acre.	REMARKS.
	METHOD OF CULTIVATION.					Md. Sr. Ch.	Md. Sr. Ch.	
1	Seedlings	15th July ...	Zala Bisra	1, 2	0·25	6 36 0	27 24 0	2 per hole.
2	Ditto	15th ,, ...	Ditto	3, 5	0·28	6 15 8	22 32 8	4 Do.
3	Ditto	15th August ...	Ditto	6, 7	0·25	5 26 8	22 28 0	2 Do.
4	Ditto	15th ,, ...	Ditto	8—10	0·30	6 10 0	20 33 5	4 Do.
5	Spacing	15th July ...	Zala ...	1, 4	0·25	6 13 0	25 12 0	2 seedlings 8″ apart.
6	Do.	15th ,, ...	Do. ...	2, 3, 6, 4 of 5	0·30	8 21 0	28 16 10	2 do. 12″ do.
7	Do.	15th ,, ...	Do. ...	3 of 5, 7	0·30	5 29 0	19 3 5	4 do. 8″ do.
8	Do.	15th ,, ...	Do. ...	8, 9	0·25	4 4 0	16 16 0	4 do. 12″ do.
9	Do.	15th August ...	Do. ...	5, 6	0·25	5 5 8	20 22 0	2 do. 8″ do.
10	Do.	15th ,, ...	Do. ...	7	0·28	6 2 8	21 26 1	2 do. 12″ do.
11	Do.	15th ,, ...	Do. ...	8, 9	0·25	4 4 0	16 16 0	4 do. 8″ do.
12	Do.	15th ,, ...	Do. ...	10, 11	0·30	3 27 8	12 12 5	4 do. 12″ do.

Two seedlings per hole transplanted early gave the best results. The local raiyats agree in this but are afraid of flooding and insect attacks carrying away the limited number of seedlings.

Sugarcane.—Ten acres devoted to the above crop, 5 acres were plant canes and the remainder was ratooned. The crop was very promising, but in November was damaged by a cyclonic wind. B 208 suffered the most and striped and yellow Tanna the least. B 208 suffered from the attack of the white borer: red rot also made its appearance.

The results obtained are given below in a tabular form :—

Plant canes.	*Ratooned canes.*
Striped Tanna.	Striped Tanna.
Yellow Tanna.	Yellow Tanna.
B 147.	B 147.
B 208.	B 208.
Dacca *Gandari.*	Dacca *Gandari.*

Results of sugarcane experiment (plant canes). 1914-15.

Serial No.	Name of canes.	Weight of *gur* per acre.
		Mds. Sr. Ch.
1.	Striped Tanna	83 17 8
2.	Yellow Tanna	89 32 8
3.	147 B	94 20 0
4.	208 B	73 12 0
5.	Dacca *Gandari*	74 32 8

Results of sugarcane experiments—Ratooned canes.

Serial No.	Name of canes.	Weight of *goor* per acre.
		MDS. SR. CH.
1.	Striped Tanna	67 35 0
2.	Yellow Tanna	55 10 0
3.	208 B	9 30 0
4.	147 B	54 5 0
5.	Dacca *Gandari*	39 0 0

Jute.—12·33 acres of jute were grown in the Farm. In Mastul an average outturn of 6 maunds 31 seers of jute fibre per acre was obtained. This crop was mainly under the Fibre Expert and will be dealt with by him separately.

Laying out (reclamation).—During the year 1914-15 the sum of Rs. 1,286 was spent in jungle clearing.

Constructions and Repairs.—In the year 1914-15 all the quarters of the subordinate staff stationed at the Farm were repaired at a cost of Rs. 4,500. In the months of April and May the quarters of Farm coolies which were all in a dilapidated condition were also repaired.

Training of Apprentices.—The number of apprentices trained on the Farm has been raised from 8 to 16. It is proposed that their practical training should be supplemented with a short course in the theory of Agriculture. The lectures are to be given in Bengali.

Implements.—Improved implements are extensively used in the Farm. At the close of the year 1914-15 the following new implements have been bought:—

(1) 12 Spring tooth harrows.
(2) 20 Panjab ploughs.
(3) 1 Corn Crusher.
(4) 1 Threshing machine.
(5) 1 Winnower.
(6) 2 Zigzag harrows.
(7) 1 Cambridge roller.

A small engine is at present being set up.

Cattle.—During the year 1914-15 there was a severe outbreak of Rinderpest. Proper precautions were taken and the animals brought under veterinary treatment. The outbreak subsided with only one death. The Rinderpest was followed by Foot and Mouth disease that was promptly treated with no casualties. As it has been found the animals lose in condition for want of good green fodder, during the year 1915-16 about 5 acres of land have been put under jowar and lucerne and guinea grass has also been provisioned for in the cropping scheme.

The expenditure incurred during the year 1914-15 is Rs. 24,656-9-8, excluding that on permanent staff. Out of this Rs. 3,133-4-7 was incurred on behalf of the expert officers. The items of expenditure are as follows:—

	Rs.	A.	P.
Five per cent. of capital value of holding and building, etc. / Ten per cent. of cost of cattle and implements. ...	8,225	0	0
Feed of cattle	3,095	0	3
Seeds	164	7	3
Manures	830	15	6
Cultivation	9,983	0	11
Railway and steamer freight	200	10	6
Coolie and cart hire	17	5	0
Postage stamps	75	0	0
Hot weather charges and miscellaneous ...	2,065	2	3
	24,656	9	8
Total receipts credited to the treasury	7,340	0	0
Value of cuttings distributed	800	0	0
	8,140	0	0

Visits.—During the year 1914-15 His Excellency the Governor of Bengal visited the farm twice and the farm was inspected by the following officers :—

Director of Agriculture, Bengal, once.
Ist Deputy Director of Agriculture, Bengal, nine times.
Superintendent, Civil Veterinary Department.
Dr. Barber, Sugarcane Expert, and
Mr. A. C. Dobbs, Officiating Imperial Agriculturist.

The Seed Depôt was amalgamated with the Farm in 1912 and the Farm Superintendent was placed in its charge.

During the year 1914-15 the following quantities of seed were supplied.

Sugarcane cuttings	159,388.
Winter paddy seeds	25 maunds.
Dhaincaa seeds	3 mds, 27 seers.
Jute seeds	27 mds.
Cowpea	5 „
Bonemeal	61 „

During the year 1914-15 the total expenditure on behalf of the Seed Depôt is Rs. 1,822-3.

	Rs.	A.
Manures	1,409	12
Seeds	307	15
Miscellaneous	104	8

Out of the amount of Rs. 1,409-12-0, Rs. 1,002-1-0 was spent in clearing up an outstanding bill for 300 maunds of bonemeal supplied during the year 1913-14, most of which was used in that year for demonstration purposes.

Of 3 tons of Basic slag and 4 tons of Muriate of Potash bought for Rs. 401-7-0, little could be sold.

Thus in the year 1914-15, Rs. 93-9-9 only was credited into the Treasury.

KENNETH McLEAN,
2nd Deputy Director of Agriculture, Bengal.

GOVERNMENT FARM,

DACCA.

YIELDS PER PLOT $\frac{1}{16}$TH ACRE EACH.

NORTH HAZI EXPERIMENTAL PLOTS, 1914-15.

Kharif crop in Roman. Rabi crop in Italics.

Numerator / Denominator = Grain / Straw Weight in maunds, seers and chittaks.

C

	Md. S. C.	Md. S. C.	Md. S. C.	Md. S. C.
Aus (cowdung, 100 maunds per acre applied before sowing rabi crops).	0 29 4 / 3 31 7	1 2 0 / 5 20 0	1 2 0 / 4 23 0	1 15 0 / 4 23 6
Matikalai ... ... (*d*)	*0 3 0 / 0 12 0*	*0 4 0 / 0 18 8*	*0 5 0 / 0 19 4*	*0 5 8 / 0 14 12*
Aus (bonemeal, 3 maunds per acre, applied before sowing kharif crop, and cowdung, 100 maunds per acre, applied before sowing rabi crop).	1 7 12 / 5 24 8	0 39 0 / 6 12 8	0 31 0 / 4 7 1	1 13 12 / 4 30 2
Matikalai ... ... (*c*)	*0 4 4 / 0 21 0*	*0 4 4 / 0 25 12*	*0 2 12 / 0 26 12*	*0 2 12 / 0 24 4*
Aus (bonemeal, 3 maunds per acre).	1 3 0 / 3 22 6	0 33 2 / 4 2 8	1 2 8 / 4 39 4	0 38 8 / 5 2 0
Matixalai ... ... (*b*)	*0 3 0 / 0 16 3*	*0 2 12 / 0 21 4*	*0 2 0 / 0 18 12*	*0 2 4 / 0 13 4*
Aus (Nil)	0 11 12 / 1 27 13	0 7 4 / 1 11 4	0 23 12 / 4 3 8	0 16 4 / 4 7 4
Matikalai ... ... (*a*)	*0 2 0 / 0 8 4*	*0 3 4 / 0 12 4*	*0 4 12 / 0 14 4*	*0 4 0 / 0 12 8*

D

	Md. S. C.	Md. S. C.	Md. S. C.	Md. S. C.
Aus (cowdung, 100 maunds per acre applied before sowing rabi crops).	1 23 0 / 7 24 12	1 18 14 / 7 1 12	1 7 8 / 4 29 4	1 21 12 / 8 24 14
Matikalai ... ... (*d*)	*0 5 12 / 0 17 8*	*0 6 8 / 0 24 4*	*0 7 8 / 0 25 12*	*0 6 12 / 0 31 4*
Aus (bonemeal, 3 maunds per acre, applied before sowing kharif crop, and cowdung, 100 maunds per acre, applied before sowing rabi crop).	1 25 0 / 5 6 13	1 23 10 / 7 13 3	1 26 12 / 0 5 33	1 12 2 / 6 7 2
Matikalai ... ... (*c*)	*0 3 4 / 0 22 10*	*0 4 12 / 0 37 8*	*0 6 0 / 0 30 0*	*0 8 6 / 1 17 10*
Aus (bonemeal, 3 maunds per acre).	1 13 4 / 5 7 12	1 19 0 / 4 29 4	0 34 0 / 6 34 12	1 18 6 / 6 3 8
Matixalai ... ... (*b*)	*0 2 8 / 0 22 8*	*0 4 4 / 0 39 12*	*0 4 2 / 0 30 14*	*0 6 0 / 1 11 4*
Aus (Nil)	0 33 4 / 5 33 4	0 39 8 / 0 4 28	1 15 6 / 4 15 14	1 24 4 / 7 13 8
Matikalai ... ... (*a*)	*0 3 0 / 0 14 12*	*0 5 2 / 0 21 14*	*0 3 12 / 0 14 6*	*0 3 4 / 0 18 0*

A

	Nil	Lime, 10 maunds per acre.	Lime, 30 maunds per acre.	Lime, 60 maunds per acre.
Aus (cowdung, 100 maunds per per acre).	1 23 4 / 6 21 2	1 25 8 / 5 25 12	1 25 4 / 5 38 4	1 22 4 / 7 7 8
Matikalai ... ... (*d*)	*0 3 0 / 0 10 8*	*0 3 8 / 0 8 12*	*0 6 8 / 0 15 8*	*0 6 4 / 0 15 0*
Aus (bonemeal, 3 maunds per acre, and cowdung, 100 maunds per acre).	1 23 12 / 5 38 6	1 27 0 / 6 11 8	1 20 4 / 5 31 6	1 29 4 / 8 23 12
Matikalai ... ... (*c*)	*0 2 8 / 0 13 0*	*0 2 4 / 0 12 12*	*0 2 4 / 0 20 12*	*0 3 8 / 0 16 4*
Aus (bonemeal, 3 maunds per per acre).	1 29 6 / 6 3 0	1 29 0 / 6 1 12	1 17 8 / 4 38 6	0 28 12 / 8 38 14
Matikalai ... ... (*b*)	*0 4 4 / 0 15 12*	*0 3 8 / 0 16 12*	*0 2 8 / 0 18 12*	*0 2 12 / 0 15 12*
Aus (Nil)	1 17 4 / 4 37 4	1 29 0 / 6 8 6	1 27 8 / 5 14 0	1 19 4 / 9 3 10
Matikalai ... ... (*a*)	*0 5 4 / 0 22 4*	*0 5 8 / 0 19 8*	*0 5 0 / 0 21 0*	*0 3 12 / 0 11 4*

B

	Nil	Lime, 10 maunds per acre.	Lime, 30 maunds per acre.	Lime, 60 maunds per acre.
Aus (cowdung, 100 maunds per per acre).	1 3 0 / 8 10 12	0 27 4 / 5 37 12	0 36 0 / 6 15 0	1 1 0 / 5 14 12
Matikalai ... ... (*d*)	*0 4 0 / 0 18 8*	*0 3 0 / 0 13 8*	*0 3 0 / 0 12 0*	*0 2 8 / 0 16 0*
Aus (bonemeal, 3 maunds per acre, and cowdung, 100 maunds per acre).	1 6 8 / 7 39 10	0 37 8 / 6 21 14	1 5 12 / 5 38 8	1 7 4 / 6 12 4
Matikalai ... ... (*c*)	*0 3 8 / 0 19 8*	*0 2 0 / 0 12 8*	*0 1 8 / 0 11 8*	*0 2 8 / 0 22 0*
Aus (bonemeal, 3 maunds per per acre).	1 1 14 / 7 23 14	0 34 4 / 5 33 0	1 5 4 / 4 26 6	1 7 12 / 5 6 8
Matikalai ... ... (*b*)	*0 4 0 / 0 20 0*	*0 3 8 / 0 21 12*	*0 2 8 / 0 19 8*	*0 2 12 / 0 23 0*
Aus (Nil)	1 2 3 / 7 31 6	1 9 14 / 5 11 12	1 10 12 / 4 33 12	1 9 10 / 5 23 4
Matikalai ... ... (*a*)	*0 3 8 / 0 11 4*	*0 4 2 / 0 17 12*	*0 2 8 / 0 16 8*	*0 2 8 / 0 15 0*

ANNUAL REPORT OF THE RAJSHAHI AGRICULTURAL STATION FOR THE YEAR 1914-15.

Situation.—The farm is situated in the town of Rampur-Boalia, the headquarters of the Rajshahi district and it serves as a centre for agricultural work in the Rajshahi Division. The land was acquired by the Rajshahi Association by purchase from land-holders and made over to Government.

The farm covers an area of 63 acres, over 50 acres of which is cultivatable, the rest being devoted to roads, house sites and tanks.

About one-third of the land is low-land suited to winter rice and jute cultivation. The remainder is high-land with a lighter soil suitable for jute, aus paddy, sugarcane and the other dry crops of the country.

The soil has been worked for a long time, a small *basti* being situated on the south side of the area at the time of acquisition.

Dr. Leather analysed the soil in 1907 and reported as follows :—

			93·92
Silica	77·90	Soda	0·21
Ferric oxide ...	4·56	Phosphoric acid ...	0·11
Alumnia	6·15	Sulphuric acid ...	0·03
Lime	3·29	Carbonic acid ...	2·34
Magnesia	1·37	Organic and	
Potash	0·65	combined matter	3·39
	93·92		100·00

The soil is characteristically low in potash, phosphates and organic matter, but there is a high percentage of lime.

The farm is divided rectangularly by two central roads into four blocks. A third road encircles the area inside the boundary fence.

The four blocks were subdivided into one-fifth acre blocks, but on the high-land the divisions have been removed during the year under report to facilitate proper cultivation and to minimise the cost.

A proper drainage system has been taken in hand and it is hoped the scheme will be completed during the current year. The iron standards of the surrounding fence have been found too fragile to keep out cattle and are being replaced by live hedge posts such as "geola" and "khoir."

A threshing floor, cattle shed and a pucca well have been built during the year. Pucca quarters for the fieldman clerk and apprentices, and a tank are now under construction. Some alterations are required in the godown which is not water-tight, and in the Farm Superintendent's quarters where a new kitchen is required. With these improvements, and an office, the farm will be fully equipped as regards buildings.

The season has not been altogether favourable. The following table indicates the actual rainfall in comparison with the normal.

Year and Month.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1914.	Inches.		Inches.	
April	5·29	4	1·81	2·9
May	6·81	9	5·56	7·7
June	5·23	9	10·81	12·6
July	13·43	18	11·45	15·1
August	11·96	15	10·75	14·7
September	7·01	7	10·40	12·4
October	1·00	1	4·46	4·9
November	*Nil.*	*Nil.*	0·31	0·6
December	0·08	1	0·06	0·2
1915.				
January	0·14	1	0·34	0·8
February	0·30	2	0·84	1·3
March	4·83	4	1·15	1·6
Total ...	56·08	71	57·94	74·8

It will be seen that although the total rainfall varied little from the normal, the rainfall was badly distributed being particularly short in October and November when the aman paddy was coming into ear and when the rabi crops—wheat and oats were down, during December, January and February. The heavy rainfall in March was beneficial to the sugarcane crop and for early sowing of kharif crops.

The farm bullocks are in good condition. There was one casualty; a bullock slipping on the pucca floor of the cattle shed and fracturing its pelvis.

A poultry house has been built with an enclosed run. Fourteen cross-bred birds (Buff Langshan-Deshi) were distributed amongst the ryats.

The programme of experimental work included—

I.—Varietal experiments with—

(*a*) Sugarcane.
(*b*) Aman paddy.
(*c*) Aus paddy.
(*d*) Potatoes.

II.—Seed selection with—

(*a*) Jute.
(*b*) Sugarcane.

III.—Manurial experiments with potatoes.
IV.—Trials of new implements.

Sugarcane Varietal Experiment.

Seven varieties were tried—

(1) Vendamukhi (Rajshahi Division).
(2) Dacca gandari (Dacca Division).
(3) Shamshara (Burdwan Division).
(4) Striped tanna } Mauritius.
(5) Yellow „ }
(6) B. 147 (Barbados).
(7) Khagri.

Triplicate plots were planted of each variety, each plot being one-tenth of an acre.

The cuttings were germinated in a seed-bed and planted out in trenches 1′ wide and 9″ deep. Despite a late sowing owing to delay in receiving the cuttings, the canes did very well.

Owing to the demand for cuttings only, the canes in five plots were fully crushed. The results are detailed below—

VARIETY OF CANE.	Number of canes.	Weight of canes.	Weight of juice.	Weight of *gur*.	Number of canes per acre.	Outturn of canes per acre.	Outturn of juice per acre.	Outturn of *gur* per acre.	Percentage of juice to canes.	Percentage of *gur* to juice.
		Mds.	Mds.	Mds.		Mds.	Mds.	Mds.		
1. Vendamukhi ...	2,510	93·13	68·0	12·10	25,100	933·10	680·0	122·10	72·6	17·97
2. B. 147	1,712	94·0	66·0	12·0	17,120	940·0	650·0	120·0	69·3	18·46
3. Yellow tanna ...	1,432	90·24	60·20	11·4	14,320	902·4	602·0	111·0	66·7	18·46
4. Samshara	2,503	68·5	50·0	8·20	25,030	685·0	500·0	85·0	73·0	17·00
5. Khagri	3,414	65·25	42·34	5·34	31,140	632·5	425·4	58·18	67·0	13·80

The local raiyats were much struck with the appearance of the canes and are anxious to get cuttings. They were particularly taken with the Tanna canes.

These excel the local canes in—

(1) their upstanding character with no tendency to lodge,
(2) their hardness which prevents damage by pigs and jackals and which does not appeal to thieves who wish chewing canes.

Their disadvantages lie in the necessity of an extra man for splitting them at harvest time and in the relatively low yield of sucrose. If the *gur* is for sugar making this would be a serious disadvantage, but where it is consumed as sweetmeats the defect is not so serious.

Aman Paddy.—A varietal experiment was conducted with the following varieties:—

(1)	Chinigura	Dacca
(2)	Kataribhog	Dinajpur
(3)	Elai	Rajshahi
(4)	Malati	Dacca
(5)	Gazia	Rajshahi
(6)	Denajuri	Rajshahi (local)

The result is noted below.

	Area in acres.	Actual yield of grain.	Yield of stem.	Yield of grain per acre.
		Mds. Srs. Chs.	Mds. Srs. Chs.	Mds. Srs. Chs.
Kataribhog, fine ...	1 7/10	20 34 0	31 2 0	12 10 10
Chinigura, fine ...	1 4/5	23 22 6	34 5 0	13 3 7
Elai, fine	5/6	11 18 0	17 0 0	13 29 9
Gazia, medium	9/10	14 5 0	28 7 0	15 27 13
Malati, medium ...	1/5	3 13 4	6 5 0	16 26 4
Denajuri	1/3	8 22 0	17 4 0	25 26 0

All plots were green-manured with dhaincha. Of the three fine varieties, Elahi gave a slightly better outturn than Chinigura and Malati gave a better outturn than Gazia, although the grains were not fully developed owing to rain failure when the crop was coming into ear. The coarse variety Denajuri gave much the highest outturn, but it is not a popular paddy with the raiyats. The earlier varieties of transplanted paddy seem to suit this soil best.

Aus Paddy.—Thirteen and a half acres of aus paddy gave an average outturn of 15 maunds per acre.

Three varieties were tried, one being a local variety and the two others were the heaviest yielders on the Dacca farm.

The following comparative table indicates the result:—

Variety.	Area.	Total yield.	Yield per acre.
Keshia paju (local coarse) ...	1 Ac.	24 0 0	24 0 0
Larcose (Dacca medium) ...	2 2/3 „	30 0 0	11 10 0
Boaljuri (Dacca medium) ...	2/5 „	6 0 0	15 0 0

These results show a wide difference between the local and the best of the introduced paddies. The experiment is being repeated.

Jute.—Six and a half acres of jute, both capsularis and olitorius, were grown for fibre, while 3 acres of both varieties were grown for seed.

The following rotation experiment was carried out:—

	Area in acres.	Total outturn.	Outturn per acre.		
			Mds. Sr. Ch.	Rs. A. P.	Rs A. P.
(1) Capsularis ...	1 1/3	15 0 0	8 14 0	at 5 8 0	45 14 9
Followed by transplanted paddy.	1 1/3	21 24 0	12 0 0	„ 2 8 0	30 0 0
					75 14 9
(2) Olitorius ...	4 2/3	92 0 0	19 21 6	„ 5 8 0	97 14 0
Followed by oats ...	4 2/3	42 0 0	9 0 0	„ 3 0 0	27 0 0
					124 14 0

The difference in yield of olitorius is 11 maunds which at Rs. 5-8-0 represents Rs. 60 an acre.

Jute seed.—One and-a-half acres was allotted to Mr. Finlow's Kakya Bombai and one-and-a-half acres to the farm grown seed (olitorius).

The outturn is given below :—

	Area in acres.	Total outturn seed.	Outturn per acre.	Fibre per acre.	Value of outturn.	Rs.	Rs.
Capsularis ...	1½	11 0 0	7 13 5	*Nil*	11 mds. at 10	...	110
Olitorius ...	1½	9 0 0	6 0 0	8 27 0	9 „ „ 10	...	90
					Fibre 13 „ „ 4	...	52
							142

The growing of jute for seed is profitable if there is a ready market for the seed, otherwise, owing to the loss of the rabi crop, it does not pay.

Potatoes.—An experiment was conducted in the preservation of potatoes throughout the rains.

A temporary thatched hut was built with racks and *machans* fitted. Ten maunds of Naini Tal and ten maunds of Italian were spread out on the *machans* each tuber apart from its neighbour. The rotten tubers were removed regularly.

Thirteen maunds 21 seers were available for planting.

The result is tabulated below along with the results from imported Italian and Darjeeling seeds :—

VARIETY.	Area in acres.	Seed used.	Total outturn.	Outturn per acre.
		Mds. sr. ch.	Mds. sr. ch.	Mds. sr. ch.
Italian	⅔	10 10 13	50 0 0	75 0 0
Darjeeling	¼	2 22 15	20 14 9	81 18 4
Naini Tal preserved in farm	⅕	3 0 0	7 0 0	35 0 0
Italian preserved in farm	⅕	2 14 4	2 7 0	10 35 0

The sprouts during storage from germinating tubers were removed which, of course, seriously deteriorated the setts.

Manurial experiment with potatoes.—The experiment was conducted on fairly uniform land divided into sub-plots of ⅛th acre each.

The manure applied are tabulated below :—

Darjeeling seed was used.

Plot No.	Manure.	Mds. sr.		Total outturn. Mds. sr. ch.	Duplicate outturn. Mds. sr. ch.
1 ⅛ Ac.	Cowdung ...	25 0	...	5 22 3	1*a* 5 35 2
	Super ...	0 10	...		
	NH_4So_4 ...	0 5	...		
	K. Sulphate	0 5	...		
2	Cowdung ...	25 0	...	5 2 12	2*a* 6 5 6
	Super ...	0 10	...		
	$NaNo_3$ ...	0 5	...		
	Pot. Sulph	0 5	...		
3	Castor cake	2½ 0	...	7 21 3	3*a* 9 11 14
4	Unmanured	...	...	4 0 8	4*a* 5 0 0

The results are very low owing to the dry season, and because the plots were not irrigated. Castor cake gave very definite results.

Other Crops.

Gram.—From 20 bighas under this crop, an average outturn of 12¼ maunds per acre was obtained.

Wheat.—The results from a small area were not good: only averaging 5½ maunds per acre. The season did not suit this crop.

Oats.—The average outturn over 14 bighas, was 9 maunds per acre.

Mustard.—Gave poor results and requires the best land on the farm.

Implements.—The small Turn Wrest plough was found very useful in breaking fallow-land and in cultivating the sugarcane areas.

The Planet Bullock Hoe is in constant use in the cane areas. Three acres of cane can be hoed in a day with a pair of bullocks and two labourers.

The Planet Junior Hand Hoes are very useful for inter-cultivation of young sugarcane and potatoes.

Expenditure and Returns.—

	Rs.
Calculating the price of land at 20 years purchase, the total capital cost of the farm may be put at	12,332
The cattle cost	870
Implement	500

Expenditure—

	Rs.	Rs.
5 per cent.	12,332	616
10 „	870	87
10 „	500	50
Construction, 1914-15—		
5 per cent.	500	25
Establishment		2,556
Expenditure for 1914-15		4,144
		7,478
Receipts, including stock in hand		4,325
		3,153

Deducting Rs. 2,556 as cost of establishment, the loss on the year's working is Rs. 597.

Inspection and visits.—The farm was inspected by the Director of Agriculture on two occasions and by Mr. Smith and myself several times.

The Commissioner of the Rajshahi Division visited the farm, and the Collector of the District, and several zamindars paid visits to the farm.

I was pleased to see that on all the occasions I visited the farm, numbers of cultivators were watching operations.

Agricultural training.—Two apprentices were trained in practical agriculture on the farm and have been sent out for demonstration work amongst the raiyats.

KENNETH MCLEAN,
2nd Deputy Director of Agriculture.

ANNUAL REPORT OF THE BURIRHAT AGRICULTURAL STATION FOR THE YEAR 1914-15.

Introductory.—The line of work is being slightly modified during the current year. Varietal experiments with country tobacco had been carried out on this farm up to three years ago when experiments were discontinued.

Babu Jamini Kumar Biswas, having been placed on special duty for survey work, has been instructed to collect seeds of the various local varieties for cultivation on the farm. The differences in the varieties will then be studied and an attempt made to improve the varieties according to the requirements of the markets.

The demand for high-grade cigarette tobacco is limited, so the flue-curing operations have been suspended in the meantime.

The cigarette manufacturers confine themselves to purchasing country tobacco.

The attention paid to the cigar tobacco is producing good results and the leaf produced is finding a ready sale.

Situation.—The farm is situated at Burirhat, 5 miles north of Rangpur town, on the border of a large tobacco-growing tract. The land was acquired in 1907 and regular work started from 1909.

The farm is 52 acres in area, divided into five blocks. Of this 38 acres are under cultivation, 14 acres being occupied by roads, buildings, bamboos, grazing area, tank, etc. Of this only about 10 acres yield good tobacco under present conditions. Green manuring alone has not been sufficient to grow good tobacco, but with plenty of cowdung, however, good tobacco can be grown almost anywhere on this farm. The dry cows from the dairy farm were grazed on the farm to supplement the supply of cowdung.

The soil is a poor sandy loam on a subsoil of almost pure sand, while pure sand occurs at one foot below the surface. Lime is absent altogether. The table below gives the rainfall and number of rainy days during 1914-15, as compared with the normal:—

Month.	Actual.		Normal.	
	Rainfall.	Days	Rainfall.	Days.
1914.	Inches.		Inches.	
April	3·62	9	3·01	4·3
May	10·34	7	10·66	11·5
June	7·06	8	18·00	15·7
July	7·73	9	15·89	15·0
August	13·11	11	12·80	13·7
September	7·59	12	14·24	13·3
October	0·70	1	4·87	4·4
November	Nil	Nil	0·12	0·2
December	Nil	Nil	0·05	0·2
1915.				
January	Nil	Nil	0·50	0·9
February	1·72	1	0·54	1·2
March	Nil	Nil	0·25	1·8

It will appear that the whole of last year was unusually dry. The low rainfall from June to September did not, however, appreciably affect the tobacco which is a winter crop. The dearth of rain from October to January, however, adversely affected the tobacco crop, which was irrigated three or four times from temporary *kutcha* wells. The effect of irrigation was very marked.

Operations during the year.—The blocks were treated as follows:—

Block.	Area.	Treatment, 1914-15.	Remarks.
	Acres.	*Kharif Cowpea.*	
A	5	Green manured in summer 1914.	
		One acre limed at 30 mds. per acre and 4 acres at 10 mds. per acre.	
		Rabi oats and peas fed to cattle	Two acres gave a fair crop and 2 acres failed.
B	3½	Cowpea green manured in summer 1914.	
		Two acres manured with lime at 30 mds. and with 200 mds. cowdung per acre. Planted with tobacco during the winter 1½ acres manured with lime at 10 mds. per acre sown with oats and peas.	The crop of tobacco was quite good, but about half an acre was damaged.
C	7½	Cowpea green manured in the summer of 1914.	
		Limed at 30 mds. per acre during the winter sown with oats and peas on whole area which was fed to the cattle.	Five acres gave a good crop, but 2½ acres failed.
		Rabi.	
D	10½	Cowpea green manured in summer 1914.	
		Four acres limed at the rate of 30 mds. and 6 acres at 10 mds. per acre winter Sumatra tobacco was grown on ½ acre oats and peas on the rest.	This crop was not very good.
E	12	Summer green manured on 4½ acres and *aus* paddy on 1½ acres winter fallow for grazing.	

The following outturns were obtained from the crop of 1913-14 :—

Crop.	Acres.	Outturn.	Outturn per acre.
		Mds. srs. chs.	Mds. srs. chs.
Sumatra	2	9 32 0	4 36 0
White Barley	2¼	12 20 0	5 33 5

Seven hundred and ninety pounds of Sumatra tobacco were sold at Rs. 591-4-0, or an average price of Rs. 60 per maund. White Barley and little Flemingen still remain unsold. This year's Sumatra is still under fermentation.

Distribution of seed.—The following seeds were supplied :—

	Oz.
Sumatra	31
Turkish	5
White Barley	7
Local	3¼

Two apprentices completed their training and four new apprentices are now under training. A Kashmere student sent by the Kashmere Supply Association is also learning the cultivation and curing of tobacco.

Babu Jamini Kumar Biswas was in charge of the farm up to 20th November 1914, when he was put on special duty for tobacco survey work. An overseer has since then been in charge under his supervision.

Receipt and Expenditure.

Expenditure.

	Rs.
Amount of expenditure	3,534
Add—5 per cent., capital value	1,500
Total ...	5,034
Add—salaries of staff	1,392
Total ...	6,426

Receipts.

	Rs.
25 maunds of tobacco at Rs. 80 per maund ...	2,000
80 „ oats at Rs. 3 per maund	240
67 „ oats at Rs. 3 „	201
Straw	150
Aus paddy	130
Total ...	2,721
Total working costs	6,426
Total estimate receipts	2,721
Total loss ...	3,705

K. McLean,

Second Deputy Director of Agriculture, Bengal.

ANNUAL REPORT OF THE RANGPUR DEMONSTRATION FARM FOR THE YEAR 1914-15.

THE land was acquired in 1905 by the Rangpur District Agricultural Association for conducting experiments in agriculture and as a Demonstration Farm. In 1906, the Farm was made over to Government and thereafter for three years was run as an Agricultural station under the direct management of the Department of Agriculture. On the 1st August 1908, the Farm reverted to the management of the Association, the Department having opened a Tobacco Farm of its own at Burirhat in tobacco tract, 5½ miles from Rangpur town. Government continued to subsidise the Farm, but it was found desirable after three years to take over complete charge of the Farm, so again the station came under the complete control of the Agricultural Department on the 1st August 1911. The expenses in connection with the working of the Farm are defrayed by Government.

The Farm is situated in the town of Rangpur near the cutchery.

The area of the Farm extends to about 20 acres, of which 15½ acres are under cultivation and the remaining portion is occupied by roads, buildings, etc., and a District Board's Nursery. Of these 15½ acres, 4½ acres is highland (including District Board's Nursery) suitable for sugarcane, potato and jute, while 11 acres is suitable for paddy. About 3 acres along the north boundary is low bheel and suited only for *aman* paddy.

There is no arrangement for irrigation on this Farm and the crops entirely depend on natural rainfall.

The soil is a rich moist loam of light texture. The subsoil at a depth of 3 or 4 feet is almost pure sand.

A sample of soil taken from the tobacco-growing portion of the Farm was analysed by the Imperial Agricultural Chemist at Pusa. Dr. Leather's report on the composition of the soil is as follows :—

	Mechanical Diameter.		Composition per cent.
Clay smaller than	.....	·002	·74
Sand „	·002	·004	3·81
Do. „	·004	·008	5·76
Do. „	·008	·016	8·78
Do. „	·016	·032	28·59
Do. „	·032	·120	42·25
Do. larger than	.....	·120	5·90
			95·83
Organic matter and combined water			4·17
Total ...			100·00

The soil is similar to the Gangetic alluvium and is a thoroughly open soil.

Chemical composition—

Carbonate of lime	·091
Organic nitrogen	·101
Available phosphoric acid	·098
Available potash	·065

"The soil contains very little carbonate of lime, but it is unusually rich in nitrogen, phosphate and potash. If it is regularly manured with farmyard manure, it should pay to lime it over in about 10 years."

The following table gives the approximate normal rainfall of Rangpur with the number of rainy days and the actual rainfall in 1914-15 :—

Month.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1914.	Inches.		Inches.	
April	3·20	8	3·01	4·3
May	12·99	9	10·66	11 5
June	7·45	6	18·00	15·7
July	5·47	13	15·89	15·0
August	13·42	16	12·80	13·7
September	10·40	14	14·24	13·3
October	·60	1	4·87	4·0
November	Nil	Nil	0·12	0·2
December	Nil	Nil	0·05	0·2
1915.				
January	Nil	Nil	0·50	0·9
February	1·91	5	0·54	1·2
March	·26	2	1·25	1·8
Total ...	55·70	74	81·93	81·8

From the above table it will be seen that the weather was very unfavourable, specially for jute and winter paddy. Transplanting of winter paddy and retting of jute were quite impossible for want of sufficient rain-water. These two crops are the principal sources of income.

The following table indicates the yields :—

Crop.	Area.	Total outturn.	Yield per acre.	Remarks.
	B. k.	Md. sr. ch.	Md. sr.	
1. Jute for fibre	2 1	12 6 0	18 10	
2. Local jute for seeds ...	6 0	9 30 0	5 0	This crop did not grow for want of sufficient rain at the time of sowing.
3. Fibre Expert's jute for seeds ...	1 15	2 23 8		
4. Aman paddy	6 0	14 29 8	7 15	On account of rain the crop was a total failure.
5. Ratooned sugarcane ...	2 0	19 8 0 *gur* 20 13 6	29 30 *gur* 33 0	
6. Mustard	0 16	2 12 0	8 25	
7. Cabbages	0 10	97 2 9	583 0	
8. Cauliflower	0 10	24 3 3	145 0	This does not suit this district.

Distribution of seeds.

Owing to the drop in the prices of jute the area under cultivation in the district has been much reduced this year; and there was thus very little demand for jute seed. It was only with difficulty 2½ maunds were distributed. As the winter paddy crop failed, only 6½ maunds of seeds were preserved. This and 20 maunds of Kataribhog paddy seeds from Dinajpur were distributed amongst the raiyats.

Implements (20 Meston ploughs and 3 Hand Hoes) were supplied direct from Calcutta for distribution.

Receipts.

	Rs.	A.	P.	
Credited to the Treasury	380	6	6	
As per outstanding bills	75	6	9	
In stock	200	0	0	(jute fibre, jute seeds, mustard and paddy, etc.)
Total ...	655	13	3	

Expenditure.

	Rs.	Rs.	A.	Rs.	A.
Five per cent. of capital expenditure and 10 per cent. of cost of cattle and implements			...	1,088	0
Establishment		472	8		
Feed of cattle	120				
Purchase of seeds	175				
Manures	75				
Implements	30				
Wages of labourers	1,430				
Petty repairs	180				
Miscellaneous and office expenses	295				
		2,305	0		
				2,777	8
Total				3,865	8

The capital expenditure is very high owing to the changes in management, on each occasion there being construction of buildings, roads, etc.

Only one apprentice was under training on this farm. After 10 months' training he was deputed to Rajshahi for demonstration work, where he unfortunately died in the month of November 1914.

Babu Jamini Nath Chakravarti was in charge of the farm during the year.

The Collector of Rangpur, J. N. Gupta, Esq., I.C.S., visited the Farm once, the Fibre Expert twice and the Director of Agriculture, 1st Deputy Director of Agriculture and myself visited and inspected the farm several times.

K. McLEAN,

Second Deputy Director of Agriculture.

ANNUAL REPORT OF THE RANGPUR DAIRY FARM FOR THE YEAR 1914-15.

Introductory.—The problem of the improvement of Bengal cattle has been considered in Bengal for many years and in 1913 the Rangpur Dairy Farm was started for the purpose of improving the local cattle.

There has been a deviation from the original scheme in that cross-bred bulls of Australian—Patna strain from Shillong are now being used under the advice of the Veterinary Department instead of selected Bengali bulls as was laid down originally.

Another question of importance, *i.e.*, the supply of milk in mufassal towns, is also being dealt with but it is subsidiary to the main question, the calves receiving first consideration. The milk supplied in mufassal towns is poor in quantity and quality and the supply of milk in sealed cans is appreciated.

As it is considered that dairy farming, pure and simple, is not profitable, profit-producing crops like sugarcane and jute are being grown to enhance the returns. No experimental cropping is being done, except with fodder crops.

With the quantity of farm yard manure-produce, good crops should be obtained.

Reduction in the expenditure on labour is aimed at by the introduction of an oil engine to drive cane crushers, grain crushers, chaff cutters and pumps, etc.

Locality.—Rangpur was selected for the farm for various reasons, chief among which were the following:—

(1) A site close to the town was available at moderate cost, the cost of acquiring 1,000 bighas being about Rs. 45,000.

(2) There is a ready market for the sale of milk at a good price.

(3) There was a strong local demand for such a farm, the local Agricultural Association having already formulated a scheme for a Cattle Farm, though of a somewhat different type.

Site, description and area.—The farm is situated very close to the railway station, on both sides of the railway line and about a mile from the town. The southern boundary of the farm runs almost parallel to the Tajhat road about 500 feet away from it, and the Skrine canal forms the greater part of the northern boundary.

The farm has an area of 1,000 bighas consisting of 750 bighas of high-lands, 200 bighas of low-lands fit for aman paddy, and about 50 bighas of *beels* (which dries up in the winter). With the exception of about 50 bighas which is rather sandy, the high-land is mostly suitable for the cultivation of jute, sugarcane, potato and tobacco.

The area is occupied as follows:—

Under cultivation	600	bighas (including paddy land.)
Bamboo groves	30	,,
Roads and drains	30	,,
Farm steading, staff-quarter and paddock	40	,,
Pasture	100	,,
Tanks, thatching grass jungle and waste	200	,,

Practically the whole of the low-land and a large part of the *beel* is being put under aman paddy.

Soil and climate.—All the high-land practically belongs to one type. The soil is a light sandy loam, and appears to be deficient in lime. Samples have been taken by the Agricultural Chemist for analysis, but the results are not yet ready. The subjoined table shows the rainfall from 1st June 1914 to 30th May 1915. With the exception of 26″ in March and 36″ in the beginning of April there was no rain till May. This retarded the sowing considerably, as some of the plots were absolutely without any moisture. The previous winter being also dry the germination of sugarcane was also adversely affected. Since the beginning of May, however, it has

been raining almost every day, and the heavy rains have unfavourably affected the weeding of jute and sugarcane.

Months.	Normal.		Actual.	
	Rainfall.	Days.	Rainfall.	Days.
1914.	Inches.		Inches.	
June	18·00	15·7	7·45	6
July	15·89	15·0	5·47	13
August	12·80	13·7	13·42	16
September	14·24	13·3	10·40	14
October	4·87	4·0	0·60	1
November	0·12	0·2	*Nil*	*Nil*
December	0·05	0·2	*Nil*	*Nil*
1915.				
January	0·50	0·9	*Nil*	*Nil*
February	0·54	1·2	1·91	5
March	1·25	1·8	0·26	2
April	3·0	4·3	3·20	8
May	10·66	11·5	12·99	9

Work done.—The work done during the year may be described under the following heads :—

(1) Reclamation.
(2) Construction.
(3) Cattle.
(4) Cultivation.

(1) *Reclamation.*—Five hundred bighas were roughly cleared and levelled last year. This work was finished, and the area has been brought under cultivation during the year.

About 200 bighas more have been cleared and levelled during the present year. There were two *beels* on the farm. The smaller of these has been converted into a tank at a cost of nearly Rs 2,500.

The tank will be used for bathing cattle and, perhaps, also for rearing fish. A drain has been cut through the larger *beel* to the Skrine canal and the whole of the *beel* has been sown with aman paddy.

All the bamboo groves have been cleared and earth has been put around the existing clumps. New shoots have also been planted to fill up gaps in the groves which are intended to be kept permanently.

A few kutcha roads have been made and drains have also been dug. The whole farm has been re-surveyed and a new map prepared.

(2) Construction—The following new works have been completed during the year :—

(i) Trough round the well.
(ii) Two liquid manure tanks.
(iii) Two cooly sheds.

The office room, calf pen, and godown which were under construction and not quite finished while last year's report was being written, has since been completed. Another 1,020 yards of the boundary has also been fenced in.

It is proposed to construct the following works during the present year, if money is available :—

(i) Third cow shed.
(ii) Engine shed.
(iii) Godown.
(iv) Pucca drain around the farm steading.
(v) One silo.

(3) Cattle.—The original idea was to deal with purely Bengal cows having no up-country blood in them. It was soon found, however, that there was hardly any breed really distinctive to Bengal or even anything approximating to it. Even cows purchased from remote villages were found to have traces of up-country blood in them. The few cows purchased as pure country cows were very small in size and poor milkers. It was therefore decided to get fairly good sized animals, even although they had a certain amount of cross-blood in them.

The following statement shows the number of cows purchased during the year with their average price:—

Place.	Number purchased.	Average price per cow.	Contingencies per cow.
		Rs. A. P.	Rs. A. P.
Malda	4	67 0 0	26 1 9
Rangpur	7	81 6 10	1 6 10
Midnapore	8	56 4 0	14 9 9
Howrah	11	51 5 6	13 1 0
Dacca	10	72 3 3	10 3 9
Jalpaiguri	1	50 0 0	39 14 3
Serajgunj	6	87 0 0	12 6 9
Bhairab	5	61 3 3	15 5 9

So far the cows obtained from Dacca and Malda appear to have given the best results, and to have stood the climatic conditions fairly well. Until, however, the large up-country cows, purchased from Sonepur, have passed one full milking period on the farm, it will be somewhat premature to say how they will be suitable for this place. The greatest difficulty, however, was experienced in obtaining good animals. Some of the cattle purchased had to be rejected on the advice of the Veterinary Department, and also because some of them were seriously affected by the change from their original conditions. Instead of obtaining the rather poor specimens available, the purchase of cows was stopped towards the end of the year. Now that we have got a herd of nearly 100 animals, it is proposed to add to the herd by the calves of our own cows (some of which are now over 2 years old) rather than by purchasing from outside. Although this process may be somewhat slow, it is likely to prove more economical in the long run and to give us better animals. If, however, really good animals are available outside they will be purchased. A statement is given below showing the daily average yield of milk per cow per day for the period the cows are actually in milk. Column I shows the average for those cows only which calved on the farm. Column II shows the figure for all the cows in milk (which include cows purchased with their calves).

	I	II.
1914.		
July	3·7	3·1
August	3·8	3·0
September	4·2	3·2
October	4·1	3·3
November	4·1	3·6
December	5·7	3·2
1915.		
January	4·3	3·3
February	3·8	3·5
March	3·7	3·3
April	3·6	3·6
May	4·4	4·2

The total yield of milk during one full lactation period were, for four of the best cows, as follows :—

1.	Kaly ...	...	2,593 lbs.
2.	Ganga ...	...	1,849 ,,
3.	Santy ...	...	1,423 ,,
4.	Laksmi ...	...	1,244¼ ,,

These yields were obtained after the calves were given a fair proportion of milk.

So far, some of the cows give indication of improvement. At the same time there are others which show, if anything, signs of deterioration by the change.

A few of the cows, as will appear from the figures given above, have given more than average of over 700 seers of milk in one lactation period. Our task is to bring up the average of the whole herd to this level. Whether or not, we can bring up the whole herd to the standard of our best animals, can only be judged.

Feeding.—Linseed cake, rape cake, mushuri, mati kalai,* pulse bhunshi are the principal concentrated food given to the cows. Cocoanut cake is also being tried. At first the cows did not take to the cocoanut cake very readily, butthey now seem to have become quite accustomed to it. The cost of feeding and up-keep comes to about Rs. 100 per cow per annum.

Juar in the rains and oats and peas (all cut green), together with paddy straw are the most suitable roughage available. Difficulty is experienced during December and again in April and May in obtaining suitable green fodder. It is proposed to erect a silo to overcome this difficulty.

Feeding and weaning calves.—The following is the system followed :—

For the first fortnight after calving, the cows are not milked at all, and the calves receive as much as they want. The surplus milk, however, is drawn out and thrown away until fit for use. After a fortnight, calves are separated from their mothers at about 8 P. M. and the cows milked at about 5 A. M. next morning. The calves are, however, allowed to suck a certain quantity of milk both before and after milking, and they are allowed to run free with their mothers for the rest of the day. This continues for about three months, the period of separation from the mother being gradually lengthened as the calf grows up.

After about three months—the actual period depending on the condition of the calf—they are again separated from their mothers at 11 A.M. and the cows are milked a second time at 3 P.M. The calves are again allowed with their mothers till evening, when they are tied up. Neither at the morning's milking nor in the evening, is all the milk allowed to be drawn, a certain amount always going to the calves. As soon as they can digest, the calves are allowed small quantities of grain, oil cake and green grass—the amount being gradually increased as they grow up. After about the fith or six month the calves are allowed with the cows only in the afternoon (after milking). They are, however, allowed larger quantities of grain and oil cake.

Diseases and casualties.—It was noted in the last year's report that a severe attack of Streptothrycasis occurred in the herd towards the end of April. With the advent of the rains there have been a few cases this year also, but to a much less degree than last year. The disease appears to recur more than once in an animal once affected. The cause of the disease has not yet been discovered, but it is not improbable that they catch the germs while out grazing. Under the directions of the Veterinary Superintendent, a foot-bath is being used, during the rains, containing a salt and phenyle solution, and the animals are made to walk through the solution while entering the stalls. There were no other serious diseases or outbreaks. The whole herd was inoculated with rinderpest serum.

The following statement shows the number of deaths and sales during the year :—

	By sale.	By death.
Cows	3	1
Calves	45	18
Bullocks	*Nil*	1
Bulls	*Nil*	1

The subjoined table shows the stock in hand on the 30th June 1915—

Bulls	...	...	... 2
Bullocks	...	...	... 59
Cows	...	...	... 111
Calves	...	...	... 101**

**Suckling	...	...	... 73
Over 1 years' old male	...	...	... 5
Over 1 years' old female	...	...	... 11
Over 2 years' old male	...	...	... 3
Over 2 years' old female.	...	...	... 9
			101

(4) *Cultivation.*—Two hundred bighas have been brought under cultivation during the year. This, together with the area ploughed up last year, makes up over 700 bighas under cultivation. Of this about 100 bighas have been left for pasture.

The following crops were grown during the year :—

Kharif—

Joar for fodder.
Aus paddy.
Jute.
Cowpea.
Sugarcane.

Rabi—

Darjeeling potatoes.
Italian ,,
Country ,,
Country tobacco.
Sumatra ,,
Mati kalai.
Mangel wurzel.
Turnips } for fodder.
Carrots }

The sugarcane was mostly used for cuttings, only the lower 3 feet being used for making *gur*.

The Italian potatoes, having regard to the high price of seeds, did not prove a great success. The Darjeeling potatoes gave a larger outturn per acre than the country potato, but the people are willing to pay a higher price for the latter—as the Darjeeling variety does not keep so well in the climate of Rangpur.

Tobacco.—Seeds of varieties of local tobacco were procured and grown side by side on $\frac{1}{5}$th acre plots as a variety test, and also to select plants for breeding. Their names are given below :—

Bhrugi, Mena Bhrugi, Jora, Matihari, Godla, Sindur Khatua, Surjamani and Surja Bhirgi.

This work, in future, will be carried out at the Burirhat farm.

Sugarcane.—It was intended to plant at least 100 bighas this season, and cuttings were procured accordingly from Dacca. A very large proportion of the cuttings obtained were, however, damaged in transit. On account of the severe drought during the early part of the season, a large proportion of the cuttings planted did not germinate, and the gaps had to be filled up at the cost of decreasing the area. The following varieties have been obtained from Dacca, Rajshahi and Burdwan and planted on half bigha plots :—

Dacca gandari.	Dacca.
Yellow tanna.	
Striped tanna.	
B. 147.	
B. 208.	
Java.	Burdwan.
Vendamukhi.	Rajshahi.

The bulk of the area, however, has been planted with *gandari*.

Paddy.—The varieties sown and planted are almost all local. A few bighas will, however, be planted with Kataribhog and four varieties of transplanted paddy—Indursal, Lohadang, Lambachikon and Paikashor—have been obtained from the Economic Botanist for trial.

Jute.—Two varieties—Kakya Bombai No. 7 and Dalsing Sarai No. 4 have been obtained from the Fibre Expert. These along with the Kakya Bombai grown on the farm last year are being tested against the local Hewti in comparatively large block.

Seeds from individual plants were selected last year and these have all been sown in separate beds for further selection.

During the rabi season it is proposed to plant 50 bighas each with potato and tobacco. The varieties of tobacco planted will depend somewhat on the results obtained this year.

Fodder crops.—Mangel and carrots as well as a plot of lucerne will be tried this year again. Several varieties of grass have been obtained from Australia for trial. A small plot of soya bean is also being grown.

Implements.—The bullock power chaff-cutter has proved very satisfactory. A number of Punjab ploughs and Spring Tooth Harrows have been obtained and are being used. A ridging plough is being used for planting sugarcane, and this as well as the Punjab plough have been found serviceable in earthing sugarcane. The Planet Junior Hoe and the Meston plough have been in constant use on the farm. It is expected to set up the engine during the current year.

Staff.—Mr. J. N. Chakravarty was in charge throughout the year, but a good deal of his time was taken up in touring in connection with the purchase of cattle and other preliminary arrangements for the farm. The construction and reclamation works also took up a good deal of his time. As all these have been nearly finished now, it is hoped that the farm will soon be in regular running order.

The following statement shows the expenditure incurred during the year:—

	Rs.	A.	P.
Establishment	3,661	0	2
Special contingencies—			
Reclamation	6,831	5	9
Purchase of implements	4,022	14	3
Purchase of cattle	5,516	6	0
Petty construction	5,498	4	6
Purchase of books, maps, etc.	142	12	0
	22,011	10	6
Regular contigencies—			
Feed of cattle	11,714	4	0
Seeds, plants and manures	2,778	8	3
Wages of labourers	11,748	0	3
Petty repairs	2,786	14	3
Purchase and repair of furniture	488	5	3
Postage and telegram charges	161	1	0
Country implements	433	12	6
Rents and taxes	76	8	0
Office expense and Miscellaneous	1,383	0	6
	31,570	6	0

The sum of Rs. 9,867-3-8 was realised as sale proceeds during the year. This represents quite a big loss, but this was anticipated when the farm was started. A few words may be added as explanation of some of the items.

Food of cattle (*Rs. 11,714-4*).—About Rs. 2,000 worth of cattle food is in stock.

Labour (*Rs. 11,748-0-3*).—Quite a large proportion of this was spent in breaking up new land and clearing small jungle, which is hardly a recurring expenditure.

Petty repairs (*Rs. 2,786-14-3*).—Some additions were made to a few buildings from this head.

It may also be noted that better outturns were obtained from most of the crops, and this is expected to be improved further during the current year.

Training of apprentices.—Nine apprentices received practical training in agriculture in 1914-15, and at present there are 12 men being trained.

Visits.—The farm was visited and inspected by the Hon'ble Member, Mr. Beatson Bell, the Collector of the district, the Government Sugarcane Expert, Dr. Barber, the Director of Agriculture, Fibre Expert, Economic Botanist, Agricultural Chemist, 1st Deputy Director of Agriculture, Veterinary Superintendent and myself.

KENNETH McLEAN,

2nd Dy. Director of Agriculture, Bengal.

Dated Dacca, the 13th July 1915.

From—The Superintendent of Agriculture, Dacca Division,

To—The Director of Agriculture, Bengal,

(Through the 2nd Deputy Director of Agriculture, Bengal).

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, DACCA DIVISION.

Staff.—The staff employed during the year under report consisted of—

One Superintendent of Agriculture for the Dacca Division.

Four Agricultural Officers for the four districts, viz., Dacca, Mymensingh, Faridpur and Barisal.

Twenty-nine Demonstrators distributed as below:—

Dacca	10
Mymensingh	10
Faridpur	5
Barisal	4

Tour.—The Superintendent was on tour for 281 days out of which 40 days were spent in Darjeeling in connection with the propagation and purchase of seed potatoes most of which were taken in the division. The number of days spent on tour by the District Agricultural Officers is noted below:—

Dacca	246
Mymensingh	230
Faridpur	213
Barisal	200

The fieldmen Demonstrators are practically wholetime outdoor officers being out in cultivators' fields at least some hours of every day assisting them in demonstration work.

The following is a list of main items of the district works:—

(1) Introduction of superior varieties of seeds specially raised by the experts.

(2) Selection of seeds on raiyats' fields mainly jute and paddy.

(3) Effect of bonemeal on paddy and jute.

(4) Effect of bone and lime on red soils.

(5) Introduction of potatoe cultivation.

(6) Introduction of superior varieties of sugarcane from Dacca Farm.

(7) Proper conservation of cattle dung and urine.

(8) Green manuring of jute with sunn hemp and paddy with dhaincha.

(9) Introduction of new crops.

(10) Introduction of improved implements.

In the Dacca and Mymensingh districts all the above items are being demonstrated. Items Nos. 3 and 4 are not applicable in Faridpur and Barisal and as such left out in those two districts.

(1) *Introduction of superior varieties of seeds specially raised by the Experts.*—Large quantities of pure seeds jute and paddy raised by the Fibre Expert and Economic Botanist on single line culture method have been distributed among cultivators and are being tried against cultivators' best seeds. The idea is to shew them that best seeds will always give best results. It is expected that there will be a great demand for these seeds in the next season. A list of the people who are trying these seeds will be found in Appendix 1.

(2) *Seed selection in raiyats' fields.*—Not only are the specially selected pure seeds being supplied to cultivators as stated above but they are also being taught how they can with advantage make better selection than they are doing now in their own fields. Their usual practice is to only keep separate the best portion of their crop without any attempt at plant

selection which is the basis of seed selection. They are being shown that keeping seeds from the best plants in a field gives a very much better result. This is the 3rd year of this work and it is daily gaining favour with the cultivators. Comparative results of seeds thus selected and those ordinarily kept by the raiyats will be found in Appendix II. These have been so convincing that applications for this demonstration are becoming larger every day. Appendix III contains the names and addresses of people who have done seed selection in our method during the year under report.

(3) *Effect of bonemeal on paddy and jute.*—Bonemeal is now being recognized by many as a profitable manure and is being used as far as their means allow not only for paddy but for jute and other crops also, such as chillies, brinjals, etc. The main difficulty of the cultivators is to find ready-money to buy the manure with. Where there are Co-operative Banks, the bone is purchased by them and distributed among the members. To others the department is supplying on credit as far as circumstances permit and the cost realized after harvest. About 500 maunds of bonemeal has been taken by raiyats during the year under report. The demand is rising so high that a scheme has been put forward for setting up a bone-crushing mill at the Dacca Farm. Some of last year's results of first application will be found in Appendix IV and the residual effects of previous applications in Appendix V.

(4) *Effect of bone and lime in red soils.*—Very convincing results have been obtained by the Fibre Expert in this experiment and attempt is being made this year to demonstrate its advantage in cultivators' fields around the Dacca Farm. Plots have been divided into two parts, both parts receiving an equal application of cowdung at 75 maunds per acre but one of these treated with an additional quantity of 3 maunds bone and 30 maunds lime per acre. This treatment of bonemeal and lime has been found to give an extra yield of about 3 maunds of fibre. The effect on the following rabi crop is still greater. Appendix VI gives the names of the owners of the holdings where this demonstration is being made.

(5) *Introduction of potatoes.*—A few years ago this was practically a foreign crop to this part. The attempt at introduction was first made by the Eastern Bengal and Assam Agricultural Department. It is now making a headway and if the progress is not retarded by any unforeseen cause the crop will soon become common in the alluvial tracts of Eastern Bengal. The demand for supply of seed potatoes is increasing every year. In 1911-12 the quantity supplied was only about 50 maunds. In 1912-13 the order rose to over 200 maunds. In 1913-14 over 500 maunds were supplied. During the year under report the divisional requirement rose to about 800 maunds and for the next season although it is too early yet and in spite of bad conditions prevailing, the indent has gone up to over 1,500 maunds. Results for the year under report will be found in Appendix VII.

(6) *Introduction of superior varieties of sugarcane from the Dacca Farm.*—Desired progress could not be achieved in this as most of the cuttings raised had to be spared for other farms and only a very small quantity was available for the district works. Arrangements have been made to get over such difficulties in future and it is hoped this work will fare quite as well as others. The demand for the year under report however was so enormous that, even if the farms were not supplied, the whole of it could never be met.

(7) *Proper conservation of cattle dung, &c.*—Cultivators are very careless in this matter. The cowdung is usually heaped in some corner in the open exposed to sun or rain while no attempt is ever made to utilize the urine. Practical demonstrations are being given to show the immense advantage in pitting the cowdung under inexpensive sheds into which is also thrown down the urine-soaked earth from the surface of the floor (*kutcha*) of the cow-shed which is of course replaced by a fresh layer of dry earth. There was some difficulty at first to induce people: but since they have seen what a rich stuff is obtained in this way with almost no cost, the number of pits are increasing by leaps and bounds. Two years before there were only about 200 pits. Last year the number rose to over 500, but this year a pit can be seen almost in every other household near the headquarters of a Demonstrator. A list showing the names and addresses of people who have lately dug such pits will be found in Appendix VIII.

(8) *Green manuring with sunn hemp for jute in light soils and dhaincha for paddy.*—Attempt is being made to extend the use of this cheap form of manuring in places where it can be profitably introduced. The progress is rather slow but it is only natural considering the prejudice people have for

anything new. Both sunn hemp and dhaincha are rank growers producing large amount of leaves a fact combined with their power of absorbing nitrogen from the atmosphere and transferring it into the soil make them the most suitable crops for the purpose. They are both grown, cut, ploughed in and incorporated with the soil about a month before the sowing of the main crop and have been found to give beneficial results. Appendix IX contains a list of the people who are trying this.

(9) *Introduction of new crops.*—The crops in view are tobacco, groundnut, boro-paddy, deep-water paddy, juar, &c. All over the division there is great demand for tobacco. Stray trials by private individuals here and there have shown that groundnut also can be grown easily. In Bakarganj there is a great scope for the introduction of deep-water paddy in the bhil tracts and aus in the Sundarbans while the introduction of boro would be a boon in some parts—specially the Sadar division of Faridpur. Cultivators often come for advice regarding supply of fodder crops. Juar has been tried by some with success. Endeavours are therefore being made to introduce these. Signs of success are already evident in many cases where seeds have been supplied and it is hoped that quite encouraging figures will be available for publication in the next year's report.

(10) *Improved implements.*—Demonstration with the Meston plough and the Planet Junior hand hoe being continued with fair success, specially in the case of the latter implement which is found very effectual for interculture in crops grown in lines. Several orders for further supply of this implement have been received. Regarding the Meston plough the advantage of soil inversion is greatly appreciated but the implement as a whole is altogether unsuitable for heavy or wet soil. People are looking forward for the introduction of a plough without these defects and attempts are being made to manufacture one.

(11) *Exhibitions.*—Then Exhibitions were held in the Division during the year under report. Two of these were general Agricultural Exhibitions—at Bandarkhola and Baliakandi in Faridpur district specially organized by the Collector of District. All sorts of the agricultural products and cattle, poultry, etc., were shown in these. From this Department, besides substantial money grants, arrangements were made for practical demonstrations. Near the Exhibition grounds a piece of land was taken and prepared in time for potatoes where the crop was grown to show that potatoes can be easily grown with advantage in the locality. A model cow-shed was raised with arrangements for proper conservation of cattle dung and urine. The uses of improved implements were also shown. All these were very much appreciated by the cultivators to whom some implements were given as prizes. The other eight Exhibitions were purely potato shows organised specially for the purpose of encouraging potato cultivation and were held in the headquarters and mufasil of the different districts. The people who took seeds from the Department and grew potatoes brought samples of their crops to these shows and were rewarded according to the merits of their crops. Local officials and people of all classes most of whom were of course cultivators gathered there. The shows were all successful as they seem to have served the purpose for which they were started. Over 1,500 maunds seed potatoes have been requisitioned up to date for the next season by cultivators against about 800 maunds last season.

(12) *General.*—Grateful acknowledgments are due to the Commissioner of the Division the Collectors and Subdivisional Officers of the different districts in the Division for their very kind help and co-operation without which very little could perhaps have been done. No help was ever grudged by them and never indeed were they approached in vain. Thanks are also due to the members of the Co-operative Department for the help they gave. Special mention may be made of Khan Shaheb Abdul Gani of Faridpur, Khan Bahadur Hemaituddin of Barisal, Babu H. L. Das of Dacca and Babu U. N. Sen of Mymensingh. Khan Shaheb Abdul Gani spared no pains to introduce the potato cultivation in Faridpur district and he organized the potato show at Bhanga at a great cost to his own purse. The District Agricultural officers also deserve commendation for the untiring zeal and energy with which they discharged their duties all throughout the year and made their demonstrations successful.

R. DAS GUPTA,

Superintendent of Agriculture, Dacca Division.

APPENDIX I.

Names of cultivators trying paddy seeds supplied by the Economic Botanist against their own seeds.

DACCA.

No.	NAMES OF CULTIVATORS.	Village.
1	Pyarimohon Mandal	Basbari.
2	Jadab Mandal	Do.
3	Asananda Mandal	Do.
4	Dandadhar Mandal...	Do.
5	Ramananda Mandal	Do.
6	Rajani Mandal	Do.
7	Dwijaraj Mandal	Do.
8	Kalicharan Mandal	Do.
9	Mahananda Mandal	Do.
10	Sheikh Khalil	Lalmati.
11	Sheikh Samiraddi	Do.
12	Sheikh Abdul Waheb	Do.
13	Abhoy Kumar Dutta	Rayerbazar.
14	Bhuban Mohon Datta	Ditto.
15	Sheikh Amsar Khan	Tallabag.
16	Sheikh Ali Nawaz	Ditto.
17	Sheikh Asu	Ditto.
18	Lakshmi	Kaprul.
19	Sheikh Nur Hossein	Do.
20	Sheikh Karam Newaz	Do.
21	Indumohon Mandal	Bibirbazar.
22	Basudeb Mandal	Ditto.
23	Tarak Chandra Pal	Katasur.
24	Sheikh Bujrat Ali	Jangamalirtek.
25	Sheikh Golam Ali	Hoshnabaz.
26	Kokaram Mandal	Shekhertek.
27	Sheikh Sharif	Bamanteki.
28	Sheikh Jelal	Jaffrabad.
29	Sheikh Belal Khan	Ditto.
30	Gopal Sing	Lalkuthi.
31	Gun Singh	Tatinibag.
32	Jaharaddin	Bhowalbag.
33	Rebati	Ditto.
34	Shekhar Singh	Ditto.
35	Khakari	Tesgaon.
36	Belai	Ditto.
37	Abdul	Ditto.
38	Tulan Singh	Manipur.
39	Paban Singh	Do.
40	Ratneswar Singh	Do.
41	Chandranath Deb Sarma	Do.
42	Manohar Singh	Do.
43	Chandrabadan Singh	Do.
44	Sitabadi	Tulsibhita.

MYMENSINGH 1914-15.

Names of cultivators trying paddy seeds supplied by the Economic Botanist against their own seeds.

No.	NAMES OF CULTIVATORS.	Village.
1	Shamuddin Munshi	Nedharchar.
2	Alam Bepari	Ditto.
3	Mamudjan Sheik	Ditto.
4	Abdul Momin	Ditto.
5	Kengu Bepari	Ditto.
6	Asmat Sheikh	Charmaseanda.
7	Girish Chandra Deb	Khagdahar.
8	Sheikh Jabbar	Galgonda.
9	Sarip Sheikh	Khagdadhar.
10	Soma Seikh	Golgonda.
11	Galim Mandal	Balashpur.
12	Lecheri Sheikh	Raghurampur.
13	Budai Sheikh	Ditto.
14	Basanta Kumar Banerji	Manipur.
15	Abdul Mazid	Golgonda.
16	Radha Nath Dey Sirker	Maizbari.
17	Sheikh Samir	Ditto.
18	Mamud Ali Fakir	Kumirgota.
19	K. N. Chowdhury	Ditto.
20	Maulavi A. M. Abdulali Khan ...	Lakhimpur.
21	Munshi Samiruddin	Maizbari.
22	Bosiruddin	Ditto.
23	Nabin Chandra Saha	Ditto.
24	Jatu Sirkar	Kalyanpur.
25	Azim Sirkar	Takuria.
26	Nayebulla Sirkar	Ditto.
27	Shekendarali	Binnafair.
28	Piarulla	Ditto.
29	Atul Chandra Chakravarty	Gangatia.
30	Chandra Kumar Dey	Gobindapur.
31	Taripuddin	Mahonpur.
32	Aharia Sirkar	Ditto.
33	Abdul Sirkar	Ditto.
34	Bipin Chandra Roy	Narundi.
35	Baharuddin	Sreerampur.
36	Noyanuddin Sircar	Berpathalia.
37	Nahag Akanda	Ditto.
38	Shermahmud Sirkar	Ditto.
39	Rajib Jibun Chakravarty	Narundi.
40	Krish Chandra Dutta	Ranarampur.
41	Iswar Chandra Dutta	Ditto.
42	Woomesh Chandra Dey	Kochpur.
43	Prokash Chandra Dutt	Jamalpur.
44	Naim Sirker	Ditto.
45	Rafet Khalipa	Ditto.
46	Nanda Kumar Sen	Kumiri.
47	Hamiuddin Khan	Katli.
48	Hafuzuddin Khan	Do.
49	Elahi Noaz	Do.
50	Gopi Nath Chakravarty	Netrakona.
51	Surendra Ch. Choudhury	Ramesharpur.
52	Santi Charan Mozumdar	Thakurkona.
53	Munshi Ahamad	Shyamganj.
54	Manir Mandal	Ditto.
55	Umesh Ch. Chakravarty	Machihala.
56	Jogendra Ch. Chakravarty	Shibnagar.
57	Baktar Miah	Maizbari.

Names of cultivators trying paddy seeds supplied by the Economic Botanist against their own seeds.

BARISAL.

No.	NAMES OF CULTIVATORS.	Village.
1	Babu Abhoy Kumar Ghose	Ganapara.
2	Ismail Chawkidar	Ditto.
3	Sonamaddi	Ditto.
4	Abdul Haque	Charnoabad.
5	Sonamaddi	Sariktala.

List of persons trying Fibre Expert's jute seeds against their own jute seeds.

DACCA.

1	Bepin Behari Mandal	Juran.
2	Jaider Khan	Tatinibag.
3	Sheikh Jaru	Bhowalbag.
4	Jugal Singh	Manipur.
5	Rajendra Kumar Dutta	Soharchar.
6	Radha Charan Gope	Fatulla.
7	Sheikh Kadir	Galachipa.
8	Ramjan Ali	Bowapur.
9	Maniruddin	Tulatuli Huglakandi.
10	Munshi Abdul Rahim	Gagatia.
11	Meharali Madbar	Nayagaon.
12	Muzuffar Ali	Ditto.

MYMENSINGH.

1	Galim Mandal	Bolashpur.
2	Jabber Shaikh	Golgonda.
3	Soma Shaikh	Maizbari.
4	Mamin Shaikh	Khagdahar.
5	Srif Shaikh	Ditto.
6	Sifatulla Shaikh	Ditto.
7	Tazemuddin Master	Boyra.
8	Tazer Mandal	Do.
9	Pagu Khan	Do.
10	Taib Shaikh	Do.
11	Sonaulla Sircar	Takuria.
12	Ram Chandra Kaivarta	Binnafair.
13	Jinu Mandal	Boyra.
14	Sonaulla Shaikh	Binnafair.
15	Minu Mandal	Boyra.
16	Sharali Shaikh	Kamalpur.
17	Kailash Chandra Roy	Bhairabpur.
18	Budhai Shaikh	Ditto.
19	Bhairab Bepari	Ditto.
20	Pukai Hazi	Ditto.
21	Sobeder Bepari	Ditto.
22	Lalmamud Shaikh	Kamalpur.
23	Mamudali Sircar	Gochamara.
24	Achmatali Shaikh	Bhairabpur
25	Mamud Hossen	Gochamara.
26	Abal Hossen Shaikh	Ditto.
27	Achu Shaikh	Darichandiber.
28	Nazier Shaikh	Ditto.
29	Rahamat Hazi	Kamalpur.
30	Mamud Hossen Munshi	Bhairabpur.
31	Hosenali Shaikh	Ditto.

MYMENSINGH—*concld.*

No.	NAMES OF CULTIVATORS.	Village.
32	Abul Hossen Sircar	Gochamara.
33	Nanda Kumar Sen	Kumree.
34	Santi Chandra Mazumdar	Thakurakona.
35	Bhusan Namasudra	Ditto.
36	Nrisendra Ch. Tapadar	Ditto.
37	Norendra Ch. Tapadar	Bangla.
38	Jogendra Ch. Chakravarty	Shibnagar.
39	Surendra Chandra Chowdhury ...	Rameswarpur.
40	Hafizuddin Khan	Katlee.
41	Surendra Chandra Shaha	Malini.
42	Atul Chandra Chakravarty	Gangatia.
43	Ditto ditto	Ditto.
44	Ditto ditto	Ditto.
45	Mayenuddin Shaikh	Jamalpur.
46	Naim Sircar	Ditto.
47	Mamud Shaikh	Ditto.
48	Akbar Mandal	Ditto.
49	Prokash Chandra Dutta	Ditto.
50	Umesh Chandra Dey	Ditto.
51	Mukunda Mohan Dutta	Paril.
52	Krishna Chandra Dutta	Ranarampur.
53	Shangsharali Sircar	Santia.
54	Razari Shaikh	Seelas.
55	Kudrat Shaik	Do.
56	Nazu Shaikh	Do.
57	Karim Sircar	Do.
58	Karim Sircar	Do.

* Result will be reported next year.

FARIDPUR.

1	Rahamtulla Munshi	Raghunandanpur.
2	Ismail Bepari	Ditto.
3	Arjan	Charkanda.
4	Sheikh Gani	Ditto.
5	Sheikh Rahim	Nurpur.
6	Parasulla Sheikh I	Binodepur.
7	Parasullah „ III	Ditto.
8	Parasulla Bepari	Char Binodepur.
9	Jatai Sheikh	Ditto.
10	Satish Chandra Roy	Khatra.
11	Dwarka Nath Roy	Do.
12	Mohon Malat	Enayetnagar.
13	Arsedali Sardar	Ditto.
14	Mostajuddi Malat	Ditto.
15	Satish Roy	Khatra.

BAKARGANJ.

No.	NAMES OF CULTIVATORS.	Village.
1	Nilkanta Deori	Madhabpasa.
2	Sonamaddi Chawkidar	Ichakati.
3	Ismail Chawkidar	Ditto.
4	Torap Ali	Ditto.
5	Nilkanta Deori	Madhabpasa.
6	Alimaddi Mridha	Saluka.*
7	Manajuddi	Badalpara.*
8	Mufajali	Ditto.
9	Alamaddi	Ditto.
10	Ismail	Ditto.

* Trying Nos. 4 and 7 against their own seeds.

Names of cultivators who are trying jute seeds Nos. 4 and 7 against their own seeds.

FARIDPUR.

1	Abbas Miah	Komarpur.
2	Panchanan Pramanik	Ditto.
3	Naimuddin Biswas	Chartipurakundi.

APPENDIX II.

RESULTS OF SEED SELECTION (JUTE).

Dacca.

(Seeds selected in 1913 and sown in 1914.)

No.	Names of cultivators.	Village.	AREA OF LAND.		DATE.		OUTTURN.		Difference of outturn.	PROFIT.	
			Selected.	Unselected.	Sowing.	Harvesting.	Selected.	Unselected.		Per plot.	Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K.	B. K.	1914	1914	MDS. S.	MDS. S. CH.	MDS. S. CH.	RS. A. P.	RS. A. P.
1	Raimohon Mistry ...	Pagla ...	1 0	1 0	2nd March ...	30th July ...	6 10	5 30 0	0 20 0	2 13 0	8 7 0
2	Pandav Biswas ...	Godnail ...	0 10	0 10	5th ,, ...	3rd August...	2 32	2 20 0	0 12 0	1 11 0	10 2 0
3	Panchananda Mandal ...	Sumairpara ...	0 10	0 10	7th ,, ...	5th ,, ...	3 2	2 7 0	0 35 0	4 14 9	28 8 6
4	Shibcharan Sirkar ...	Ditto ...	1 0	1 0	12th ,, ...	7th ,, ...	6 20	5 34 0	0 26 0	3 10 6	10 15 6
5	Narain Bepari ...	Kayetpara ...	1 0	1 0	15th ,, ...	12th ,, ...	5 35	5 10 0	0 25 0	3 8 3	10 8 9
6	Pandav Haldar ...	Baruikhali ...	0 5	0 5	17th ,, ...	15th ,, ...	1 22	1 5 0	0 17 0	2 6 3	28 11 0
7	Hriday Manzi ...	Brahman Kitta ...	0 10	0 10	28th February	19th July ...	3 21	3 1 0	0 20 0	2 13 0	16 14 0
8	Bochai Sircar ...	Tegharia ...	1 0	1 0	2nd March ...	22nd ,, ...	5 27	5 0 0	0 27 0	3 12 9	11 6 3
9	Jayhari Mandal ...	Basbari ...	1 0	1 0	13th April ...	20th September	4 39	4 18 0	0 21 0	2 15 3	8 13 9
10	Harimohon Mandal ...	Sarail ...	0 10	0 10	1st March ...	23rd July ...	2 20	2 13 0	0 7 0	0 15 9	5 14 6
11	Madhab Mandal ...	Rathur ...	0 10	0 10	3rd ,, ...	3rd August...	3 12	2 29 0	0 23 0	3 3 9	19 6 6
12	Meghu Mandal ...	Baghia ...	1 0	1 0	26th February	2nd August...	4 15	4 13 0	0 2 0	0 4 6	0 13 6
13	Rammohon Mandal ...	Hakbo ...	1 0	1 0	14th April ...	11th September	6 1	5 13 0	0 28 0	3 15 0	11 13 3
14	Ratan Barui ...	Surjanarainpur	1 10	1 10	1st March ...	12th July ...	8 39	8 12 0	0 27 0	3 12 9	11 6 3
15	Yakub Khan ...	Khilgaon ...	1 0	1 0	13th April ...	17th September	6 12	6 5 0	0 7 0	0 15 9	2 15 0
16	Krishna Kumar Madbar	Sudharchar ...	1 0	1 0	26th February	23rd August...	7 0	6 15 0	0 25 0	3 8 3	10 8 6
17	Imamaddin Madbar ...	Nayagaon ...	1 0	1 0	28th ,,	17th ,, ...	7 25	7 12 8	0 12 8	1 12 8	5 6 0
18	Monmohon Barui ...	Imamerchar ...	1 0	1 0	25th ,,	23rd ,, ...	6 5	5 35 8	0 9 8	1 5 11	4 1 9
19	Sasimohon Barui ...	Sudharchar ...	1 0	1 0	26th ,,	23rd ,, ...	8 8	7 30 0	0 13 0	1 13 9	5 7 9
20	Abdul Miah ...	Baruipara ...	1 0	1 0	23rd ,,	18th ,, ...	7 2	7 0 0	0 2 0	0 4 6	0 13 6
21	Dengar Khan ...	Kusumpur ...	1 0	1 0	3rd March ...	26th ,, ...	8 5	7 25 0	0 20 0	2 13 0	8 7 0
22	Dasarath Barui ...	Dabsa ...	1 0	1 0	6th ,, ...	22nd ,, ...	7 11	7 2 0	0 9 0	1 4 3	3 12 9
23	Dhanumaddin Sirkar ...	Shyamerchar ...	1 0	1 0	8th ,, ...	24th ,, ...	8 0	7 35 0	0 5 0	0 11 3	2 1 9
24	Sheikh Yasin ...	Kusumpur ...	1 0	1 0	3rd ,, ...	25th ,, ...	7 11	6 30 0	0 21 0	2 15 3	8 13 9
25	Araj Ali ...	Shialdi ...	1 0	1 0	22nd February	19th ,, ...	7 22	7 12 0	0 10 0	1 6 6	4 3 6

APPENDIX II—*contd.*

RESULTS OF SEED SELECTION (JUTE).

Mymensingh.

(Seeds selected in 1913 and sown in 1914.)

No.	NAME OF CULTIVATOR.	Village.	AREA OF LAND.		DATE.		OUTTURN.		Difference of outturn.	PROFIT.	
			Selected.	Unselected.	Showing.	Harvesting.	Selected.	Unselected.		Per plot.	Per area.
1	2	3	4	5	6	7	8	9	10	11	12
					1914.	1914.					
1	Akebali Duftry ...	Rajerbagh ...	0 6	0 6	3rd March ...	5th July ...	2 4	2 3 0	0 1 0	0 4	2 5 0
2	Akali Shaikh	Malauri ...	1 0	1 0	5th ,, ...	9th ,, ...	6 6	6 3 0	0 3 0	0 12	2 4 0
3	Easin Sirkar	Ashura	0 13	0 15	4th ,, ...	8th ,, ...	5 12	5 0 0	0 12 0	3 0	12 0 0
4	Kabit Munshi	Do. ...	0 12	0 12	6th ,, ...	6th ,, ...	4 12	4 10 0	0 2 0	0 8	2 8 0
5	Jennath Ali Ahamed ...	Akashi	1 4	1 4	7th ,, ...	10th ,, ...	7 22	7 5 0	0 17 0	4 4	10 10 0
6	Goba Shaikh	Do.	1 0	1 0	4th ,, ...	6th ,, ...	6 30	6 22 0	0 8 0	2 0	6 0 0
7	Rupa Mandal	Do.	0 12	0 12	9th ,, ...	13th ,, ...	3 37	3 33 0	0 4 0	1 0	5 0 0
8	Sam Mandal	Do.	0 15	0 15	5th ,, ...	15th ,, ...	5 10	4 34 0	0 16 0	4 0	16 0 0
9	Inauddin Ahamed ...	Kuralia	0 6	0 6	12th ,, ...	10th ,, ...	1 35	1 30 0	0 5 0	1 4	15 0 0
10	Intazuddin Khandkar ...	Dampara ...	0 9	0 9	15th ,, ...	16th ,, ...	2 27	2 5 0	0 22 0	5 8	36 10 8
11	Abdul Zabbar Kazi ...	Malauri ...	0 10	0 10	6th ,, ...	20th ,, ...	3 25	3 10 0	0 15 0	3 12	22 8 0
12	Taripuddin	Mohanpur ...	1 0	1 0	10th ,, ...	18th ,, ...	7 20	7 10 0	0 10 0	2 8	7 8 0
13	Iretulla Shaikh ...	Ditto	0 12	0 12	11th ,, ...	19th ,, ...	4 25	4 0 0	0 25 0	6 4	31 4 0
14	Mandul a Sarkar ...	Gorakanda ...	0 15	0 15	18th ,, ...	21st ,, ...	4 30	4 20 0	0 10 0	2 8	10 0 0
15	Namber Shaikh ...	Bar pathalia ...	0 6	0 6	20th ,, ...	17th ,, ...	2 10	2 6 0	0 4 0	1 0	12 0 0
16	Nohe Shaikh	Ditto ...	0 9	0 9	9th ,, ...	12th ,, ...	3 20	3 15 0	0 5 0	1 4	8 5 4
17	Taezuddin	Ditto ...	0 15	0 15	7th ,, ...	10th ,, ...	4 15	4 10 0	0 5 0	1 4	5 0 0
18	Nazir Mandal	Ditto ...	1 0	1 0	21st ,, ...	24th ,, ...	7 8	7 5 0	0 3 0	0 12	2 4 0
19	Lone Mamud Sarkar ...	Godasimla ...	1 0	1 0	23rd ,, ...	22nd ,, ...	6 35	6 10 0	0 25 0	6 4	18 12 0
20	Nanda Kumar Sen ...	Kumree	0 15	0 15	19th ,, ...	27th ,, ...	5 22	5 12 0	0 10 0	2 8	10 0 0
21	Abdul Majid	Barshikora ...	0 15	0 15	20th ,, ...	24th ,, ...	4 30	4 20 0	0 10 0	2 8	10 0 0
22	Sonatan Shaha ...	Mafini	0 12	0 12	22nd ,, ...	23rd ,, ...	3 20	3 10 0	0 10 0	2 8	12 8 0
23	Hamiduddir Khan ...	Katlee	0 10	0 10	25th ,, ...	27th ,, ...	2 22	2 10 0	0 12 0	3 0	18 0 0
24	Amchar Khan	Do.	0 10	0 10	1st April ...	30th ,, ...	2 35	2 30 0	0 5 0	1 4	7 8 0
25	Dhirendra Chandra Roy	Shibnagar ...	0 6	0 6	3rd ,, ...	30th ,, ...	2 10	2 10 0	...	...	...
26	Mahiuddin Moktear ...	Medini	1 0	1 0	26th March ...	1st August ...	6 30	6 30 0	..	...	...
27	Santi Charan Mazumdar	Thakorakona ...	0 12	0 12	1st April ...	3rd ,, ...	4 30	4 15 0	0 15 0	3 12	18 12 0
28	Gayanath Dey Sircar ...	Ditto ...	0 15	0 15	5th ,, ...	7th ,, ...	5 3	5 3 0	...	...	...
29	Bhusan Namasudra ...	Ditto ...	0 6	0 6	24th March ...	29th July ...	2 16	2 6 0	0 10 0	2 8	25 0 0
30	Kahin Serkar	Seelasi	1 0	1 0	26th ,, ...	1st August ...	6 18	6 3 0	0 15 0	3 12	11 4 0
31	Krishna Chandra Dey	Saetia	1 0	1 0	3rd April ...	6th ,, ...	7 20	7 20 0	...	...	...
32	Barkatulla Munshi ...	Seelasi	0 10	0 10	5th ,, ...	29th July ...	3 10	3 10 0	...	...	...
33	Abdul Rahaman Munshi	Charsallia ...	0 10	0 10	9th ,, ...	28th ,, ...	3 25	3 15 0	0 10 0	2 8	15 0 0
34	Ibrahim Sarkar ...	Bagua	0 10	0 10	7th ,, ...	24th ,, ...	3 25	3 20 0	0 5 0	1 4	7 8 0
35	Shamser Ali Sarkar ...	Charmaslanda ...	0 9	0 9	23rd March ...	29th ,, ...	3 10	3 5 0	0 5 0	1 4	8 5 4
36	Abdul Rahaman Sarkar	Bagua	0 12	0 12	25th ,, ...	23rd ,, ...	4 0	3 38 0	0 2 0	0 8	2 8 0
37	Edim Sarkar	Balaspur ...	0 15	0 15	26th ,, ...	5th ,, ...	5 35	5 20 0	0 15 0	3 12	15 0 0
38	Golim Mandal	Do.	0 9	0 9	3rd April ...	13th August ...	2 17	2 5 0	0 12 0	3 0	20 0 0
39	Setu Mandal	Golgonda ...	0 12	0 12	7th ,, ...	9th ,, ...	3 18	3 18 0	...	...	...
40	Jabbar Shekh	Do.	0 6	0 6	9th ,, ...	15th ,, ...	2 15	2 15 0	...	...	...
41	Abbas Ali Sarkar ...	Kallasen ...	0 15	0 15	10th ,, ...	16th ,, ...	3 36	3 33 0	0 3 0	0 12	3 0 0
42	Tami Munshi	Akua	1 0	1 0	15th ,, ...	12th ,, ...	7 0	6 15 0	0 25 0	6 4	18 12 0
43	Ismail Sarkar	Do.	0 9	0 9	29th March ...	3rd ,, ...	4 0	3 18 0	0 22 0	5 8	36 10 8
44	Makim Raj	Do.	0 12	0 12	31st ,, ...	1st ,, ...	3 30	3 25 0	0 5 0	1 4	6 4 0
45	Azu Sheikh	Salakia	0 15	0 15	6th April ...	9th ,, ...	4 39	4 22 0	0 17 0	4 4	17 0 0
46	Rusmat Shaikh ...	Ghatail	0 6	0 6	8th ,, ...	7th ,, ...	2 20	2 14 0	0 6 0	1 8	15 0 0
47	Sarat Ali Shaikh ...	Charsatkia ...	0 1	0 1	11th ,, ...	15th ,, ...	7 6	7 3 0	0 3 0	0 12	45 0 0
48	Mamudchan	Ghatail	0 15	0 15	9th ,, ...	13th ,, ...	5 24	5 24 0	...	...	...
49	Mamud Ali Shaikh ...	Do.	0 9	0 9	15th ,, ...	10th ,, ...	3 33	3 20 0	0 13 0	3 4	21 10 8
50	Azam Shaikh	Sredhorkhola ...	0 12	0 12	3rd ,, ...	5th ,, ...	4 38	4 30 0	0 8 0	2 0	10 0 0

RESULTS OF SEED SELECTION (PADDY).

Dacca.

Selected in 1913.

			B. K.	B. K.	1914	1914	Md. S.	Md. S. C.	Md. S. C.	Rs. A.	Rs. A. P.
1	Dengar Khan ...	Kusumpur ...	1 0	1 0	7th April ...	5th November	4 35	4 30 0	0 5 0	0 6 0	1 2 0
2	Sheikh Yasin ...	Ditto ...	1 0	1 0	8th ,, ...	7th ,,	4 10	4 0 0	0 10 0	0 12 0	2 4 0
3	Krishna Kumar Madbar	Sudharchar ...	1 0	1 0	10th ,, ...	8th ,,	3 20	3 1 0	0 19 0	1 6 9	4 4 3
4	Imamaddi Madbar ...	Nayagaon ...	1 0	1 0	25th ,, ...	12th ,,	6 4	6 0 0	0 4 0	0 4 9	0 14 3
5	Abdul Jubbar ...	Ditto ...	1 0	1 0	27th ,, ...	20th ,,	4 0	3 18 0	0 22 0	1 10 4	4 15 0
6	Basanta Kumar Dhali ...	Raipura ...	1 0	1 0	28th ,, ...	22nd ,,	4 20	4 10 0	0 10 0	0 12 0	2 4 0
7	Gulmamamud Talukdar	Chhatphaita ...	1 0	1 0	25th ,, ...	30th ,,	7 10	6 35 0	0 15 0	1 2 0	3 6 0
8	Mammohan Moral (Mandal).	Garkule char ...	1 0	1 0	28th ,, ...	26th ,,	8 0	7 36 0	0 4 0	0 4 9	0 14 3
9	Muhammad Jiosh ...	Kusumpur ...	1 0	1 0	27th ,, ...	28th ,,	5 3	4 35 0	0 8 0	0 9 6	1 12 6
10	Hazrat Ali ...	Bagbari ...	1 0	1 0	30th ,, ...	29th ,,	3 12	3 5 0	0 7 0	0 8 3	1 8 9
11	Bochai Sirkar ...	Tegharia ...	1 10	1 10	10th March ...	8th December	7 12	6 28 0	0 24 0	1 12 9	3 9 6
12	Lakshmi Mistry ...	Ditto ...	1 0	1 0	10th ,, ...	8th ,,	4 20	4 1 0	0 19 0	1 6 9	4 4 3
13	Chandranath Sirkar ...	Ditto ...	1 0	1 0	10th ,, ...	9th ,,	4 15	4 0 0	0 15 0	1 2 0	3 6 0
14	Purna Mandal ...	Akrabari ...	0 10	0 10	9th ,, ...	8th ,,	2 5	1 39 0	0 6 0	0 7 3	2 11 6
15	Nawabali Sheikh ...	Solla ...	1 0	1 0	12th ,, ...	11th ,,	4 13	4 1 0	0 12 0	0 14 6	2 11 6
16	Rajmohon Mridha ...	Noadha ...	1 0	1 0	13th ,, ...	14th ,,	4 13	4 1 0	0 12 0	0 14 6	2 11 6
17	Monmohon Das ...	Pubdi ...	1 0	1 0	8th ,, ...	11th ,,	4 7	3 21 0	0 26 0	1 15 3	5 13 9
18	Ramsunder Bepari ...	Arakul ...	0 16	0 16	11th ,, ...	12th ,,	3 1	2 11 0	0 30 0	2 4 0	8 7 0

APPENDIX II—*concld.*

RESULTS OF WINTER PADDY SEED SELECTION, 1914.

Mymensingh.

No.	Name of Cultivator.	Village.	Area.		Outturn.			Profit.	
			Selected.	Unselected.	Selected.	Unselected.	Difference.	Per plot.	Per area.
			B. K.	B. K.	Md. S.	Md. S.	Md. S.	Rs. A. P.	Rs. A.
1	Shaikh Jabber ...	Golgonda ...	0 5	0 5	1 5	1 0	0 5	0 6 0	4 8
2	Setu Mandal	Ditto ...	0 5	0 5	1 10	1 0	0 10	0 12 0	9 0
3	Girish Ch. Das ...	Khagdahar ...	0 5	0 5	1 0	0 30	0 10	0 12 0	9 0
4	Jabu Sircar	Kalyanpur ...	0 5	0 5	1 20	1 5	0 15	1 2 0	13 8
5	Shaikh Sharip ...	Khagdahar ...	0 5	0 5	0 35	0 30	0 5	0 6 0	4 8
6	,, Somedali ...	Ramgopalpur ...	0 5	0 5	1 18	1 12	0 6	0 7 3	5 7
7	Rohim Chopdar ...	Dariapur ...	0 5	0 5	1 20	1 8	0 12	0 14 5	10 13
8	Basanta K. Chakravarty ...	Maminpur ...	0 5	0 5	1 10	1 2	0 8	0 9 7	7 3
9	Tarip Shaikh ...	Pailamari ...	0 5	0 5	0 30	0 25	0 5	0 6 0	4 8
10	Lecheri Shaikh ...	Raghurampur ...	0 5	0 5	1 0	0 30	0 10	0 12 0	9 0
11	Budai Shaikh ...	Ditto ...	0 5	0 5	1 6	1 0	0 6	0 7 3	5 7
12	Abdul Oahed Bepari ...	Solakia ...	0 5	0 5	1 9	1 4	0 5	0 6 0	4 8
13	Abhoy Chandra Sukladas	Do. ...	0 5	0 5	1 12	1 7	0 5	0 6 0	4 8
14	Shaikh Abdulmazid ...	Ghaital ...	0 5	0 5	0 37	0 27	0 10	0 12 0	9 0
15	,, Mamudali ...	Do. ...	0 5	0 5	1 5	1 0	0 5	0 6 0	4 8
16	,, Ablash ...	Do. ...	0 5	0 5	1 10	1 2	0 8	0 9 7	7 3
17	,, Sayedali ...	Do. ...	0 5	0 5	1 12	1 0	0 12	0 14 5	10 13
18	,, Akali... ...	Malauri ...	0 5	0 5	0 39	0 30	0 9	0 10 9	8 1
19	Kabit Munshi ...	Ashura ...	0 5	0 5	1 4	1 0	0 4	0 4 9	3 9
20	Iasin Sircar	Do. ...	0 5	0 5	1 20	1 8	0 12	0 14 5	10 13
21	Jinnatali Ahamed ...	Akashi	0 5	0 5	1 5	1 0	0 5	0 6 0	4 8
22	Entazuddin Khandaker ...	Dampara ...	0 5	0 5	1 3	0 35	0 8	0 9 7	7 3
23	Akkebali Duftry ...	Malauri ...	0 5	0 5	1 9	1 0	0 9	0 10 9	8 1
24	Kalim Sircar ...	Seelasi ...	0 5	0 5	1 14	1 0	0 14	1 0 9	12 9
25	Abdul Rahaman Sircar ...	Charsaltia ...	0 5	0 5	1 10	1 0	0 10	0 12 0	9 0
26	Santi Ch. Mazumdar ...	Thakurakona ...	0 5	0 5	1 16	1 2	0 14	1 0 9	12 9
27	Sonatan Shaha ...	Malini ...	0 5	0 5	1 15	1 0	0 15	1 2 0	13 8
28	Akshoy Kumar Sen ...	Kumree ...	0 5	0 5	0 35	0 30	0 5	0 6 0	4 8
29	Umesh Ch. Chakrabarty ...	Machihala ...	0 5	0 5	1 18	1 8	0 10	0 12 0	9 0
30	Keshab Ch. Chakrabarty ...	Ditto ...	0 5	0 5	1 20	1 5	0 15	1 2 0	13 8
31	Hafeezuddin Khan ...	Katlee ...	0 5	0 5	1 19	1 14	0 5	0 6 0	4 8
32	Jalim Sircar	Naogaon ...	0 5	0 5	1 6	1 0	0 6	0 7 3	5 7
33	Ramhari Dey Sircar ...	Manusua ...	0 5	0 5	1 10	1 0	0 10	0 12 0	9 0
34	Girish Ch. Dey Sircar ...	Maijbari ...	0 5	0 5	1 0	0 35	0 5	0 6 0	4 8
35	Radhanath Dey ...	Ditto ...	0 5	0 5	0 30	0 22	0 8	0 9 7	7 3
36	Etimaddin Fakir ...	Ditto ...	0 5	0 5	1 2	0 36	0 6	0 7 3	5 7
37	Nabin Ch. Shaha ...	Ditto ...	0 5	0 5	0 35	0 27	0 8	0 9 7	7 3
38	Meher Shaikh ...	Ditto ...	0 5	0 5	1 3	0 37	0 6	0 7 3	5 7
39	Munshi Rahamatulla ...	Mrizapur ...	0 5	0 5	1 10	1 0	0 10	0 12 0	9 0
40	Mamudjan Shaikh ...	Ditto ...	0 5	0 5	1 5	1 0	0 5	0 6 0	4 8
41	Arib Mandal ...	Goraikuti ...	0 5	0 5	1 8	1 0	0 8	0 9 7	7 3
42	Shaikh Abdul ...	Kandulia ...	0 5	0 5	1 15	1 3	0 12	0 14 5	10 13
43	Sabed Shaikh ...	Bahadurpur ...	0 5	0 5	1 20	1 10	0 10	0 12 0	9 0
44	Tarak Nath Acharjee ...	Malatipur ...	0 5	0 5	1 16	1 4	0 12	0 14 5	10 13
45	Maifal Shaikh ...	Kakuria ...	0 5	0 5	1 12	1 2	0 10	0 12 0	9 0
46	Digendra Ch. Nag ...	Kalibari ...	0 5	0 5	1 8	1 3	0 5	0 6 0	4 8
47	Purna Ch. Pal ...	Ditto ...	0 5	0 5	1 6	1 0	0 6	0 7 3	5 7
48	Mohesh Ch. Dey ...	Kojgar ...	0 5	0 5	1 10	1 0	0 10	0 12 0	9 0
49	Gobinda Kishore Kar ...	Do. ...	0 5	0 5	1 4	1 0	0 4	0 4 9	3 9
50	Kalu Shaikh	Kakuria ...	0 5	0 5	1 15	1 0	0 15	1 2 0	13 8

APPENDIX III.

List of persons who have selected paddy seeds for trial in 1915.

DACCA.

No.	NAMES OF CULTIVATORS.	Village.
1	Zulan Singh	Manipur.
2	Chandranath Deb Sarma	Ditto.
3	Din Munjuri	Ditto.
4	Ramgopal Singh	Ditto.
5	Gopal Singh	Ditto.
6	Gun Singh	Ditto.
7	Shekhar Singh	Ditto.
8	Patan Singh	Ditto.
9	Sagir Mahmud	Markoon.
10	Sheikh Kerali	Nayaganj.
11	Radha Charan Mistry	Sarail.
12	Bepin Behari Mandal	Jaran.
13	Asananda Mandal	Basbari.
14	Krishna Charan Chowkidar ...	Ditto.
15	Dwijaraj Mondal	Ditto.
16	Pyari Mohan Mondal	Ditto.
17	Sheikh Nabi	Gharialbari.
18	Pyari Mohan Chowkidar	Khamer.
19	Sheikh Jahar Ali	Ditto.
20	Nasu Prodhania	Kapasia.
21	Tamijuddin	Jamirarchar.
22	Kamini Kumar Mullick	Brahmangdi.
23	Sheikh Munshi	Baniachal.
24	Asgar Ali	Brahmundi.
25	Abbas	Ghoradia.
26	Ali Maddin Bhuiya	Reranpara.
27	Shahebali	Velanagar.
28	Nowbali	Brahmandi.
29	Jamani Kumar Mullick	Ditto.
30	Jagat Chandra Dey	Shilmandi.
31	Akshoy Kumar Bal	Kalagachhia.
32	Muhammad Hafizuddin	Sallabaz.
33	Munsoor Ali	Nilukha.
34	Ibrahim Kazi	Ditto.
35	Abdul Rahim	Gagatia.
36	Maniruddin	Daulatkandi.
37	Sabed Ali	Sapmara.
38	Saritulla Sirkar	Huglakandi.
39	Abdul Wahed	Gakulnagar.
40	Easin Munshi	Koroipur.
41	Tamiruddin	Haglakandi.
42	Radha Charan Gope	Fatulla.
43	Gadadhar Mistry	Pagla.
44	Raimohon Mistry	Kamalpur.
45	Rajendra Kumar Datta	Sheharchar.
46	Guru Prasad Mistry	Nayamati.
47	Judhistir Poddar	Pagla.
48	Prosanna Sirkar	Baila.
49	Ram Charan Mistry	Godnail.
50	Ekinali	Kusumpur.
51	Rehajuddin	Ditto.
52	Dengar Khan	Ditto.
53	Sheikh Manu	Tengariapara.
54	Sheikh Wahed	Kusumpur.
55	Arajali	Shialdi.
56	Sheikh Nasaruddin	Kusumpur
57	Sheikh Latu	Ditto.
58	Badshahi Haldar	Purbagaon.

APPENDIX III—*contd.*

DACCA—*concld.*

No.	NAMES OF CULTIVATORS.	Village.
59	Krishnakumar Madbar	Sudherchur.
60	Hari Mandal	Sridhar khola.
61	Panchanando Mandal	Ditto.
62	Gosaidas Mandal	Ditto.
63	Sachai Mandal	Ditto.
64	Sona Mullah	Rashkati.
65	Rupnuddi Sheikh	Ditto.
66	Maijuddi Sheikh	Ditto.
67	Sheikh Meherali	Baligaon.
68	Alhadi Mulla	Ditto.
69	Bakshi Mahomed	Ditto.
70	Sonatan Mandal	Angaira.
71	Nanda Mandal	Do.
72	Prohlad Mandal	Kanainagar.
73	Bhuban Mandal	Bhakum.
74	Kokaram Mandal	Do.
75	Sarbesh Khan	Do.
76	Lalbehari Kaviraj	Chakighata.
77	Gaynath Bepari	Ditto.
78	Shibnath Bepari	Ditto.
79	Janakinath Sirkar	Kristapur.

MYMENSINGH.

1	Jabber Shaikh	Golgonda.
2	Setu Mandal	Ditto.
3	Girish Chandra Dev	Khagdahar.
4	Jabu Sircar	Kalyanpur.
5	Sharif Shaikh	Khagdahar.
6	Somedali Shaikh	Ramgopalpur.
7	Rohim Chopdar	Darnapur.
8	Basanta Kumar Chakravarty ...	Maminpur.
9	Tarip Shaikh	Pailamari.
10	Lechuri Shaikh	Raghurampur.
11	Budai Shaikh	Ditto.
12	Abdul Wahed Bepari	Solakia.
13	Abhoy Chandra Sukladas	Ditto.
14	Shaikh Abdul Mazid	Ghaital.
15	Shaikh Mamudali	Ditto.
16	Abbash Shaikh	Ditto.
17	Shaikh Sayedali	Ditto.
18	Akali Shaikh	Malauri.
19	Kabil Munshi	Ashura.
20	Easin Sircar	Ditto.
21	Jinnat Ali Ahamed	Akhshi.
22	Intaz Ali Khandakar	Dampara.
23	Akebali Duftry	Malauri.
24	Kalim Sircar	Seelashi.
25	Abdul Rahaman Sircar	Charsaltia.
26	Santi Chandra Mazumdar	Thakurakona.
27	Sonatan Shaha	Malini.
28	Akshoy Kumar Sen	Kumree.
29	Umesh Chandra Chakravarty ...	Machahala.
30	Keshab Chandra Chakravarty ...	Ditto.
31	Hafizuddin Khan	Katlee.
32	Jalim Sircar	Naogaon.
33	Ramhari Dey Sircar	Manashura.

APPENDIX III—*contd.*

MYMENSINGH—*concld.*

No.	NAMES OF CULTIVATORS.	Village.
34	Girish Chandra Dey Sircar	Maijbari.
35	Radha Nath Dey	Ditto.
36	Elimaddin Fakir	Ditto.
37	Nabin Chandra Shaha	Ditto.
38	Meher Shaikh	Ditto.
39	Munshi Rahamatulla	Mrizapur.
40	Mamudjan Shaikh	Ditto.
41	Mamudjan Shaikh	Bairan.
42	Arib Mandal	Goraikuti.
43	Abdul Shaikh	Kandulia.
44	Sobed Shaikh	Bohadorpur.
45	Tarak Nath Acharjee	Malatipur.
46	Maifal Shaikh	Kakuria.
47	Digendra Chandra Nag	Kalibari.
48	Purna Chandra Pal	Ditto.
49	Mahesh Chandra Dey	Kojgor.
50	Gobinda Kishore Kar	Ditto.
51	Kalu Shaikh	Kakuria.
52	Girish Chandra Dey	Darifatepur.
53	Fatik Chandra Das	Joyrajpur.
54	Naim Sircar	Jamalpur.

FARIDPUR.

1	Maulvi Mahamad Ekram	Kamalapur.
2	Maulvi Muhamad Ekram	Ditto.
3	Maulvi Abdul Gafur	Kajuri.
4	Maulvi Abdul Gafur	Do.
5	Maulvi Abdul Gafur	Do.
6	Sefatulla Haxi	Charkamalapur.
7	Sefatulla Haxi	Ditto.
8	Abdul Hamid	Nurpur.
9	Abdul Monnaf	Do.
10	Shaikh Manik	Do.
11	Shek Pachu	Do.
12	Arjun Mattabbar	Charkanda.
13	Chaijaddi	Nurpur.
14	Shaikh Rahim	Do.
15	Eakub Shaikh	Do.
16	Moran Chaudhury	Do.
17	Paresulla Shek I	Benodepur, Rajbari.
18	Paresulla Shek II	Ditto.
19	Paresulla Bepari	Ditto.
20	Jatai Sheikh	Ditto.
21	Derajaddi Shek	Ditto.
22	Manik Mandal	Ditto.
23	Salimuddin Sardar	Dadshi, Rajbari.
24	Jeran Mella	Ujanchar, Goalando.
25	Hem Chandra Joardar	Manirampur, Jasai.
26	Sadaraddin Molla	Chorjhikari, Habashpur.
27	Daori Chowkidar	Mohiserchor, Madaripur.
28	Adu Mala	Ditto.
29	Madan Bepari	Ditto.
30	Easin Sakdar	Ditto.
31	Jaynaddin Hazi	Ditto.
32	Pachu Kazi	Lakhiganj, Madaripur.
33	Hachanaddi Bepari	Ditto.
34	Mofizaddin Kazi	Ditto.

APPENDIX III—*contd.*

FARIDPUR—*concld.*

No.	NAMES OF CULTIVATIORS.	Village.
35	Mohan Malat	Enayetnagor. Kalkini.
36	Arshedali Sardar	Ditto.
37	Kanai Lal Biswas	Khatra, Gopalganga.
38	Tilak Chandra Bala	Karalgati.
39	Kali Charan Biswas	Aripara.
40	Har Chand Bhabak	Karalgati.
41	Nibaron Majhi	Do.
42	Akrur Chandra Barai	Do.
43	Kamala K. Kapali	Manikpur.
44	Madan Kapali	Do.
45	Ram Charan Kapali	Do.
46	Ram Das Kapali	Do.
47	Prasanna Kapali	Do.
48	Lakhi Kanta Kapali	Do.
49	Katiswar Biswas	Char Madhupur.
50	Jajneswar Biswas	Gopalpur.
51	Kanai Lal Biswas	Do.
52	Indra Nath Biswas	Do.

BAKARGANJ.

1	Babu Abhoy Kumar Ghosh	Ganapara.
2	Babu Abhoy Kumar Ghosh	Ditto.
3	Babu Abhoy Kumar Ghosh	Ditto.
4	Ismail Chawkidar	Ichakati.
5	Abdul Gani	Bagora.
6	Umarali Chaprasi	Do.
7	Nawab Gazi	Do.
8	Rahimaddi	Do.
9	Hachanaddin	Rupatali.
10	Jahiruddin Mirdha	Ditto.
11	Abdul Haque	Charnoabad.
12	Golam Khalek	Ditto.
13	Golam Khalek	Ditto.
14	Abdul Latiff	Ditto.
15	Abdul Haque, II	Ditto.
16	Jobadali	Sariktala.
17	Sonamaddi	Ditto.
18	Alemdar Khan	Ditto.
19	Abdul Khan	Ditto.
20	Aminaddi	Ditto.
21	Tassimuddin	Ditto.
22	Ahadali Gazi	Ditto.
23	Maher Ali	Ditto.
24	Gahar Ali	Ditto.
25	Majan Ali	Ditto.

APPENDIX III—*contd.*

List of persons who have selected jute seeds for trial in 1915.

DACCA.

No.	Names of Cultivators.	Village.
1	Sheikh Kerali	Nayagaon.
2	Sagir Mahmud	Markoon.
3	Sheikh Jaru	Bhowalbag.
4	Kazimuddin	Teribazar.
5	Mirshab	Daniadar.
6	Abbas Bhuiya	Ditto.
7	Jugal Sing	Manipur.
8	Sheikh Nizam	Companibag.
9	Khoda Newaz Khan	Tallabag.
10	Huchani	Koshkhana.
11	Krishna Chandra Chowkidar	Basbari.
12	Asananda Mandal	Do.
13	Rameswar Mandal	Nalban.
14	Hiralal Mandal	Do.
15	Gadadhar Mistry	Do.
16	Bepin Behary Mandal	Juran.
17	Aswathama Mandal	Sarail.
18	Govrchand Das	Bangia Howla.
19	Kaitaun Ghesari	Ditto.
20	Pitambar Chowkidar	Gokulnagar.
21	Tamijuddin Mullah	Jamirer char.
22	Fulmahmad Sheikh	Khamer.
23	Monmohan Das	Do.
24	Abdul Gafur	Munuria.
25	Karim Bux	Munuria.
26	Advait Bepari	Do.
27	Raimohan Mandal	Deoli.
28	Mocktal Hossein	Basalia.
29	Sheikh Kadam Ali	Garalia.
30	Nandalal	Benttia.
31	Charan Das	Do.
32	Jaidar Khan	Tatinibag.
33	Kamini Kumar Mullick	Brahmandi.
34	Kalim Hossien	Daspara.
35	Sheikh Munshi	Baniachal.
36	Shaheb Ali	Velanagar.
37	Hakim Khan	Chinishpur.
38	Abbas	Ghoradra.
39	Shahjehan	Puranpara.
40	Shalim Sheik	Shilmandi*.
41	Talmahmud	Mahisasura*.
42	Ibrahim	Santivela*.
43	Maniruddin	Daulatkandi.
44	Samiruddin	Huglakandi.
45	Jamiruddin	Do.
46	Sabed Ali	Sapmara.
47	Rechmat Ali	Daulatkandi.
48	Easin Munshi	Koroipur.
49	Mohim Sheikh	Huglukandi.
50	Abdul Gaffur	Gauripur.
51	Sanud	Nilukha.
52	Muhammad Hafizuddin	Do.
53	Radhacharan Gope	Fatulla.
54	Jabar Ali	Do.
55	Rajendra Chandra Dutt	Shebaachar.
56	Guru Prosad Mistry	Nayamati.
57	Prosanna Sirkar	Balia.

* These cultivators have not sown jute.

APPENDIX III—*contd.*

DACCA—*concld.*

No.	NAMES OF CULTIVATORS.	Villag
58	Ramcharan Mistry	Godnail.
59	Pandav Biswas	Do.
60	Gadadhar Mistry	Pagla.
61	Raimohon Mistry	Kamalpur.
62	Shibcharan Sirkar	Sumavipara.
63	Baburali Khan	Chhatphaita.
64	Krista Kumar Mandal	Sudharchar.
65	Radhacharan Mandal	Imamerchar.
66	Syed Ali	Nayagaon.
67	Yakub Ali	Charkewar.
68	Dengar Khan	Kusumpur.
69	Shaikh Latu.	Ditto.
70	Bidhu Shaikh	Tengariapara.
71	Araj Ali	Shialdi.
72	Nasaruddin	Kasumpur.
73	Sontan Mandal	Angaira.
74	Nandu Mandal	Ditto.
75	Prohlad Mandal	Kanainagar.
76	Bhuban Mandal	Bhakum.
77	Kokaram Mandal	Ditto.
78	Sarbesh Khan	Ditto.
79	Lalbehari Kaviraj	Chakighata.
80	Gayanath Bepari	Ditto.
81	Shibnath Bepari	Ditto.
82	Janaki Nath Sirkar	Kistapur.

MYMENSINGH.

1	Galim Mandal	Balaspur.
2	Jabbar Sheikh	Golgonda.
3	Somi Sheikh	Mirjapur.
4	Mamin Sheikh	Khagdahar.
5	Sharif Sheikh	Ditto.
6	Sifatulla Sheikh	Ditto.
7	Tajimuddin Mastar	Boyra.
8	Tajer Mandal	Do.
9	Pegu Khan	Do.
10	Tayeb Sheikh	Do.
11	Sonaulla Sarkar	Thakuria.
12	Ram Charan Kaibarta	Binnafair.
13	Tuni Mandal	Boyra.
14	Sonaullah Sheikh	Binnafair.
15	Minu Mandal	Boyra.
16	Saharali Sheikh	Kamalpur.
17	Kailas Chandra Roy	Bhairabpur.
18	Budhai Sheikh	Ditto.
19	Bhairab Bepari	Ditto.
20	Pukrai Hazi	Ditto.
21	Sabedar Bepari	Ditto.
22	Lalmahmud Sheikh	Kamalpur.
23	Mahmud Ali Sarkar	Gochamara.
24	Achmat Ali Sheikh	Bhairabpur.
25	Mahmud Hossein	Gochamara.
26	Abdul Hossein	Ditto.
27	Achu Sheikh	Ditto.
28	Nazir Sheikh	Ditto.
29	Rachmat Hazi	Kamalpur.

APPENDIX III—*contd.*

MYMENSINGH—*concld.*

No.	NAMES OF CULTIVATORS.	Village.
30	Mahmud Ali Hossein	Bhairabpur.
31	Hosen Ali Sheikh	Ditto.
32	Nanda Kumar Sen	Kumri.
33	Santi Charan Mazumdar	Thakurakona.
34	Bhushan Namasudra	Ditto.
35	Nirendra Tarafdar	Ditto.
36	Narendra Tarafdar	Bangla.
37	Jogesh Chakravarty	Shibnagar.
38	Suresh Chandra Chaudhuri	Rameshwarpur.
39	Haffizuddin Khan	Katlee.
40	Surendra Chandra Sha	Malini.
41	Atul Chandra Chakravarty	Gungatia.
42	Atul Chandra Chakravarty	Ditto.
43	Atul Chandra Chakravarty	Ditto.
44	Mainuddin Sheikh	Zamalpur.
45	Naim Sarkar	Ditto.
46	Mahmud Sheikh	Ditto.
47	Akbar Mandal	Ditto.
48	Prokash Chandra Dutta	Ditto.
49	Umesh Chandra De	Ditto.
50	Mukunda Mohan Dutta	Parail.
51	Krishna Chandra Dutta	Ranarampur
52	Sahar Ali Sirkar	Santai.
53	Bazoi Sheikh	Shilashi.
54	Kudrat Sheikh	Ditto.
55	Mazu Sheikh	Ditto.
56	Kalim Sirkar	Ditto.
57	Kalim Sirkar	Ditto.

FARIDPUR.

1	Rahamatulla Munshi	Kamarpur.
2	Ismail Bepari	Raghunandanpur.
3	Iachin Mandal	Ditto.
4	Rahamatulla Munshi	Ditto.
5	Iachin Mandal	Ditto.
6	Abdul Wahed Jotedar	Kamarpur.
7	Eakub	Nurpur.
8	Aijaddir	Do.
9	Sheikh Neda	Do.
10	Sheikh Panchu	Do.
11	Asaledi	Do.
12	Sukur Mann	Do.
13	Akhiladdi	Do.
14	Manik Mandal	Benodepur.
15	Salimaddin Sardar	Dadshi.
16	Juran Mollah	Ujanchar.
17	Hem Chandra Joardar	Manirampur.
18	Sadaruddin Mullah	Char Jhikari.
19	Mohan Malat	Enayetnagar.
20	Arshedali Sardar	Ditto.
21	Mostajuddi Malat	Ditto.
22	Rajanaddi Bepari	Chralepur.
23	Joynal Mirdha	Enayetnagar.
24	Daori Chowkidar	Mohisharchar.
25	Adu Mullah	Ditto.
26	Madan Bepari	Ditto.
27	Easin Sikdar	Ditto.
28	Serajuddin Hazi	Ditto.

APPENDIX III—*concld.*

FARIDPUR—*concld.*

No.	NAMES OF CULTIVATORS.	Village.
29	Kamala Kumar Kapali	Manikpur.
30	Ram Charan Kapali	Ditto.
31	Prosonna Kumar Kapali	Ditto.
32	Charu Mohan Roy	Girishnagar.
33	Dwarka Nath Roy	Khatra.
34	Dr. S. M. Bose	Gopalganj.
35	Tarak Chandra Mandal	Ditto.
36	Madan Kapali	Manikpur.
37	Ramdas Kapali	Ditto.
38	Lakshmikanta Kapali	Ditto.
39	Kutiswar Biswas	Char Madhupur.

APPENDIX IV.

EFFECT OF BONEMEAL (APPLIED IN 1914) ON JUTE.

Dacca.

No.	Name of Cultivator.	Village.	AREA OF LAND.		Quantity of manure.	OUTTURN (1913).		Difference of outturn.	Price of outturn.	Cost of manure.	PROFIT	
			Manured.	Unmanured.		Manured.	Unmanured.				Per plot.	Per acre.
			B. K. CH.	B. K. CH.	M. S. CH.	M. S. CH.	M. S. CH.	M. S. CH.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	Joyhari Mandal	Basbari ...	1 0 0	1 0 0	1 0 0	6 11 0	5 13 0	0 38 0	5 5 6	3 0 0	2 5 6	7 0 6
2	Sheikh Baser	Maneswar ...	0 10 0	0 10 0	0 20 0	3 18 0	2 28 0	0 30 0	4 3 6	1 8 0	2 11 6	16 5 0
3	Sheikh Ali Newaj	Ditto ...	0 10 0	0 10 0	0 20 0	3 1 0	2 11 8	0 29 8	4 2 4	1 8 0	2 10 4	15 14 0
4	Moctal Hossein	Basalia ...	1 0 0	1 0 0	1 0 0	7 5 0	6 11 4	0 33 12	4 12 0	3 0 0	1 12 0	5 4 0
5	Joyhari Mandal	Basbari ...	1 10 0	1 10 0	1 20 0	9 25 0	8 13 0	1 12 0	7 5 0	4 8 0	2 13 0	5 10 0
6	Asananda Mondal	Ditto ...	1 10 0	1 10 0	1 20 0	10 18 0	8 11 0	2 7 0	12 3 9	4 8 0	7 11 9	15 7 6
7	Krista Chowkidar	Ditto ...	1 0 0	1 0 0	1 0 0	6 22 0	5 1 0	1 21 0	8 9 3	3 0 0	5 9 3	16 11 9
8	Saladeb Mandal	Sultanganj ...	1 0 0	1 0 0	1 0 0	5 9 0	4 1 8	1 7 8	6 10 11	3 0 0	3 10 11	11 0 9
9	Durga Charan Mandal ...	Jaffrabad ...	1 0 0	1 0 0	1 0 0	4 16 8	2 13 12	2 2 12	11 10 3	3 0 0	8 10 3	25 14 9
10	Sheikh Baser	Maneswar ...	0 10 0	0 10 0	0 20 0	3 13 0	2 15 0	0 38 0	5 5 6	1 8 0	3 13 6	23 1 0
11	Sheikh Ali Newar ...	Ditto ...	0 10 0	0 10 0	0 20 0	2 29 0	1 18 0	1 11 0	7 2 9	1 8 0	5 10 9	34 10 6

APPENDIX IV—*contd.*

EFFECT OF BONEMEAL (APPLIED IN 1913-14) ON WINTER PADDY.

Dacca.

NAME.	Quantity of bonemeal used.	Land measured.	Results obtained.
	Maunds.	Bighas.	
Fajee	5	5	Obtained nearly 4½ maunds of paddy per bigha from unmanured plots, while nearly 6 maunds of paddy per bigha from the manured plots.
Nizam	5	5	Obtained nearly 4½ maunds per bigha from the unmanured plots, while about 6 maunds per bigha from the manured plots.
Badal	8	8	Obtained nearly 4½ maunds per bigha from the unmanured plots, while nearly 6½ maunds from the manured plots. One of these plots practically yielded no crops, 2—3 previous years. On the application of bonemeal he got nearly 6 maunds of paddy per bigha from that particular plot
Aziz	5	5	Obtained from the unmanured plots nearly 1½ maunds paddy in excess (per bigha) from the yield by the unmanured plots.
Koromnawar ...	5	5	Obtained from the manured plots nearly 2 maunds in excess per bigha. One of his plots practically yielded no crops, 2—3 previous years. On applying bonemeal he got nearly 5 maunds of paddy per bigha from that particular plot.
Katun	5	5	Obtained an excess of about 1½ maunds of paddy per bigha from the manured plots.
Chiful	1	1	Ditto. ditto.
Ahim	3	3	Ditto. ditto.
Omarali	3	3	Ditto. ditto.
Ahmadali No. I ..	2	2	Obtained an excess of nearly 2 maunds of paddy per bigha from the manured plots.
Syedali	3	3	Ditto. ditto.
Ahamadali No. II ...	2	2	Obtained an excess of nearly 1½ maunds of paddy per bigha from the manured plots.
Chamir	3	3	Ditto. ditto.
Munshi	50	3	.....

APPENDIX IV—*concld.*

No.	Name of cultivator.	Village.	Area of land.		Quantity of manures.	Outturn.		Difference of outturn.	Price of outturn.	Cost of manure.	Profit.	
			Manured.	Unmanured.		Manured.	Unmanured.				Per plot.	Per acre.

Effect of Bonemeal (applied in 1914) on Jute.

Mymensingh.

			B. K. C.	B. K. C.	M. S. C.	M. S. C.	M. S. C.	M. S. C.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	Tarini Kanta Chaki ...	Maijbari ...	2 10 0	2 10 0	2 20 0	14 10 0	13 7 0	1 3 0	10 12 0	7 8 0	3 4 0	3 14 3	
2	Tazimuddin Ahamed ...	Rudrabayra ...	2 10 0	2 10 0	2 20 0	13 20 0	12 17 0	1 3 0	10 12 0	7 8 0	3 4 0	3 14 3	
3	Tazimuddin Mandal ...	Ditto ...	0 10 0	0 10 0	0 20 0	2 30 0	2 20 0	0 10 0	2 8 0	1 8 0	1 0 0	6 0 0	
4	Jabedali Mandal	Ditto ...	0 10 0	0 10 0	0 20 0	2 28 0	2 16 0	0 12 0	3 0 0	1 8 0	1 8 0	9 0 0	
5	Akbar Mandal	Ditto ...	1 0 0	1 0 0	1 0 0	5 12 0	4 30 0	0 22 0	5 8 0	3 0 0	2 8 0	7 8 0	
6	Piarulla Mandal	Ditto ...	2 10 0	2 10 0	2 20 0	13 0 0	11 10 0	1 30 0	17 8 0	7 8 0	10 0 0	20 0 0	
7	Talebali Sircar	Chakshyamram-pur.	1 0 0	1 0 0	1 0 0	4 0 0	3 11 0	0 29 0	7 4 0	3 0 0	4 4 0	12 12 0	
8	Farmanali†	Ditto ...	1 0 0	1 0 0	1 0 0	3 20 0	...	...	...	...	...	...	
9	Rahamat Bepari	Ditto ...	1 0 0	1 0 0	1 0 0	3 30 0	2 20 0	1 10 0	12 8 0	3 0 0	9 8 0	28 8 0	
10	Isaf Shaikh	Ditto ...	1 0 0	1 0 0	1 0 0	3 5 0	2 20 0	0 25 0	6 4 0	3 0 0	3 4 0	9 12 0	
11	Jamanali Sircar†	Poranganj ...	1 0 0	1 0 0	1 0 0	21 3 0	...	...	...	...	...	...	
12	Jadali Shaikh†	Baigunbari ...	1 0 0	1 0 0	1 0 0	4 10 0	...	...	...	...	...	...	
13	Mann Shaikh†	Ditto ...	1 0 0	1 0 0	1 0 0	5 0 0	...	...	...	...	...	...	
14	Samiruddin Munshi ...	Maijbari ...	1 0 0	1 0 0	1 0 0	6 10 0	5 30 0	0 20 0	5 0 0	3 0 0	2 0 0	6 0 0	
15	Araman Sircar	Kushtia ...	1 0 0	1 0 0	1 0 0	4 20 0	3 30 0	0 30 0	7 8 0	3 0 0	4 8 0	13 8 0	
16	Shaikh Bazu	Do. ...	1 0 0	1 0 0	1 0 0	3 20 0	2 30 0	0 30 0	7 8 0	3 0 0	4 8 0	13 8 0	

† Ploughed and transplanted winter paddy.

Effect of Bonemeal (applied in 1914) on Winter Paddy.

Mymensingh.

			B. K. C.	B. K. C.	M. S. C.	M. S. C.	M. S. C.	M. S. C.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	Samiruddin Munshi ..	Maijbari ...	0 10 0	0 10 0	0 20 0	3 28 8	2 38 8	0 30 0	2 4 0	1 8 0	0 12 0	4 8 0	
2	Munshi Amiruddin ...	Goraikuli ...	1 0 0	1 0 0	1 0 0	4 13 5	3 0 0	1 13 5	4 0 0	3 0 0	1 0 0	3 0 0	
3	Munshi Amiruddin ...	Ditto ...	0 5 0	0 5 0	0 10 0	2 20 0	2 0 0	0 20 0	1 8 0	0 12 0	0 12 0	9 0 0	
4	Taibali Sircar	Chakshamram-pur.	0 15 0	0 15 0	0 30 0	6 0 0	5 0 0	1 0 0	3 0 0	3 4 0	0 12 0	3 0 0	
5	Forman Bepari	Ditto ...	1 0 0	1 0 0	1 0 0	6 10 0	4 20 0	1 30 0	5 4 0	2 0 0	2 4 0	6 12 0	
6	Mafizuddin Sircar ...	Chakhasadia ...	0 10 0	0 10 0	0 20 0	4 0 0	3 4 0	0 36 0	2 11 3	1 8 0	1 3 3	7 3 6	
7	Shaikh Manu‡	Baigunbari ...	1 0 0	1 0 0	1 0 0	...	...	...	...	...	...	...	
8	Tarak Nath Acharjee ...	Malatipur ...	1 0 0	1 0 0	1 0 0	4 30 0	3 4 0	1 26 0	4 15 3	3 0 0	1 15 3	5 13 9	
9	Sheku Bepari	Kushtia ...	0 10 0	0 10 0	0 20 0	7 0 0	6 0 0	1 0 0	3 0 0	1 8 0	1 8 0	9 0 0	
10	Makim Shaikh	Do. ...	1 0 0	1 0 0	1 0 0	5 20 0	4 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
11	Shaik Peru	Seclasi ...	1 0 0	1 0 0	1 0 0	8 10 0	6 30 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
12	Abdul Sircar	Bagua ...	1 0 0	1 0 0	1 0 0	5 30 0	4 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
13	Kalimmir Sikari ...	Do. ...	0 15 0	0 15 0	0 30 0	5 30 0	4 30 0	1 0 0	3 0 0	2 4 0	0 12 0	3 0 0	
14	Kudrat Fakir	Saltia ...	1 0 0	1 0 0	1 0 0	5 10 0	3 30 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
15	Jafarali Munshi	Soakia ...	0 15 0	0 15 0	0 30 0	5 10 0	4 0 0	1 10 0	3 12 0	2 4 0	1 8 0	6 0 0	
16	Abdul Shaikh	Charsaltia ...	1 10 0	1 10 0	1 20 0	8 30 0	6 25 0	2 5 0	6 0 9	4 8 0	1 14 0	3 12 0	
17	Abdul Sircar	Bagua ...	2 0 0	2 0 0	2 0 0	15 30 0	3 10 0	2 20 0	7 8 0	6 0 0	1 8 0	2 4 0	
18	Abdul Sircar	Do. ...	0 15 0	0 15 0	0 30 0	5 30 0	4 20 0	1 10 0	3 12 0	2 4 0	1 8 0	6 0 0	
19	Gani Mamud Sircar ...	Do. ...	1 0 0	1 0 0	1 0 0	6 30 0	5 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
20	Denat Akanda	Barabani ...	1 0 0	1 0 0	1 0 0	6 20 0	5 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
21	Sonaullah Sircar	Do. ...	1 0 0	1 0 0	1 0 0	5 30 0	4 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
22	Muhammad Hossen Sircar	Bara	1 0 0	1 0 0	1 0 0	7 20 0	6 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
23	Muhammad Hossen Sircar	Do.	1 0 0	1 0 0	1 0 0	7 10 0	6 0 0	1 10 0	3 12 0	3 0 0	0 12 0	2 4 0	
24	Paran Mandal	Do.	1 0 0	1 0 0	1 0 0	6 30 0	5 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
25	Paran Mandal ...	Do.	1 0 0	1 0 0	1 0 0	6 20 0	5 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
26	Hosenali Master ...	Do.	1 0 0	1 0 0	1 0 0	7 10 0	6 0 0	1 10 0	3 12 0	3 0 0	0 12 0	2 4 0	
27	Hosenali Master ...	Do.	0 10 0	0 10 0	0 20 0	4 30 0	3 30 0	1 0 0	3 0 0	1 8 0	1 8 0	9 0 0	
28	Farid Khan	Do.	0 10 0	0 10 0	0 20 0	3 35 0	3 0 0	0 35 0	2 10 0	3 8 0	1 2 0	6 12 0	
29	Saati Chandra Muzumdar	Thakurakona ...	1 0 0	1 0 0	1 0 0	5 20 0	4 0 0	1 20 0	4 8 0	1 0 0	1 8 0	4 8 0	
30	Sauti Chandra Muzumdar	Ditto ...	1 0 0	1 0 0	1 0 0	6 30 0	5 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
31	Sauti Chandra Muzumdar	Ditto ...	1 0 0	1 0 0	1 0 0	5 20 0	4 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
32	Sauti Chandra Muzumdar	Ditto ...	1 0 0	1 0 0	1 0 0	4 30 0	3 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
33	Abdul Mazid	Barshikura ...	1 0 0	1 0 0	1 0 0	5 20 0	4 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
34	Elahi Nowaj Khan ...	Katlee ...	1 0 0	1 0 0	1 0 0	6 25 0	5 0 0	1 25 0	4 14 0	3 0 0	1 14 0	5 10 0	
35	Nanda Kishore Nath ...	Deuli ...	1 0 0	1 0 0	1 0 0	5 15 0	4 0 0	1 15 0	4 2 0	3 0 0	1 2 0	3 6 0	
36	Kasiab Chandra Chakra-varty.	Salpa Andhaoia	1 0 0	1 0 0	1 0 0	5 20 0	4 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
37	Umesh Chandra Chakra-varty.	Machihata ...	1 0 0	1 0 0	1 0 0	5 20 0	4 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
38	Kamini Kumar Das ...	Birpagulia ...	1 0 0	1 0 0	1 0 0	5 30 0	4 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	
39	Farman Gazi	Madhua ...	1 0 0	1 0 0	1 0 0	7 35 0	6 0 0	1 35 0	5 10 0	3 0 0	2 10 0	7 14 0	
40	Ekumali Shaikh	Do. ...	1 0 0	1 0 0	1 0 0	5 25 0	4 0 0	1 25 0	4 14 0	3 0 0	1 14 0	5 10 0	
41	Meher Mondal	Do. ...	1 0 0	1 0 0	1 0 0	5 10 0	4 0 0	1 10 0	3 12 0	3 0 0	0 12 0	2 4 0	
42	Sona Bhuiya	Do. ...	2 0 0	2 0 0	2 0 0	13 20 0	10 25 0	2 35 0	8 10 0	6 0 0	2 10 0	3 15 0	
43	Mamin Shaikh	Do. ...	0 10 0	0 10 0	0 20 0	3 0 0	2 10 0	0 30 0	2 4 0	1 8 0	0 12 0	4 8 0	
44	Sonamulla Sircar	Uchagram ...	1 0 0	1 0 0	1 0 0	8 25 0	7 0 0	1 25 0	4 14 0	3 0 0	1 14 0	5 10 0	
45	Golam Sircar	Do. ...	1 0 0	1 0 0	1 0 0	7 20 0	6 0 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	
46	Naripulla Sircar	Do. ...	2 0 0	2 0 0	2 0 0	18 20 0	16 0 0	2 20 0	7 8 0	6 0 0	1 8 0	2 4 0	
47	Umesh Chandra Day ...	Jamalpur ...	2 0 0	2 0 0	2 0 0	13 0 0	10 0 0	3 0 0	9 0 0	6 0 0	3 0 0	4 8 0	
48	Krishna Chandra Dutta ...	Kanarampur	1 10 0	1 10 0	1 20 0	8 5 0	6 0 0	2 5 0	6 6 0	4 8 0	1 14 0	3 12 0	
49	Naim Sircar	Madhua ...	1 0 0	1 0 0	1 0 0	6 25 0	5 0 0	1 25 0	4 14 0	3 0 0	1 14 0	5 10 0	

‡ Fed by cattle.

APPENDIX V.

RESIDUAL EFFECT OF BONEMEAL (AMAN PADDY) APPLIED IN 1913.

Dacca.

No.	Name of Cultivator.	Village.	AREA OF LAND.		Quantity of manure.	1913							RESIDUAL EFFECT, 1914.				
						OUTTURN.		Difference of outturn.	Price of outturn.	Cost of manure.	PROFIT.		OUTTURN.		Difference of outturn.	PROFIT.	
			Manured.	Unmanured.		Manured.	Unmanured.				Per plot.	Per acre.	Manured.	Unmanured.		Per plot.	Per acre
			B. K. C.	B. K. C.	MS. S. C.	Ms. S. C.	Ms. S. C.	Ms. S. C.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs A. P.	Ms. S. C.	Ms. S. C.	Ms. S. C.	Rs. A. P.	Rs. A. P.
1	Shaikh Adam	Katasur ...	0 10 0	0 10 0	0 20 0	4 2 8	2 14 0	1 17 8	5 1 0	1 8 0	3 9 0	21 6 0	3 0 0	2 35 0	0 5 0	0 6 3	2 5 6
2	,, Osman Khan	Jaffrabad ...	1 0 0	1 0 0	1 0 0	7 35 0	5 1 4	2 33 12	8 7 9	3 0 0	5 7 9	16 7 3	5 10 0	4 31 0	0 19 0	1 7 9	4 7 3
3	,, Panchu Munshi	Kaprul ...	0 10 0	0 10 0	0 20 0	5 35 0	3 2 0	2 33 0	8 7 7	1 8 0	6 15 7	41 13 6	2 10 0	2 1 8	0 8 8	0 10 7	3 15 6
4	Kalicharan Mondal	Basbari ...	0 6 0	0 6 0	0 12 0	2 29 8	1 10 0	1 10 8	3 12 7	0 12 0	3 0 7	30 5 10	1 30 0	1 25 4	0 4 12	0 5 11	3 7 2
5	Ram Sankar Sarkar	Duttapara ...	1 0 0	1 0 0	1 0 0	7 21 0	4 10 8	3 10 8	9 12 7	3 0 0	6 12 7	20 5 9	5 0 0	3 20 0	1 20 0	4 11 0	14 1 0
6	Yanus Muhammad	Gazipur ...	1 0 0	1 0 0	1 0 0	6 8 8	3 35 0	2 13 8	7 0 3	3 0 0	4 0 3	12 0 9	4 0 0	3 10 0	0 30 0	2 5 6	7 0 6
7	Krishna Mohan Mondal	Duttapara ...	1 0 0	1 0 0	1 0 0	5 30 4	3 25 0	2 5 4	6 6 3	3 0 0	3 6 3	10 2 9	5 0 0	4 20 0	0 20 0	1 9 0	3 11 0
8	Shaikh Kerait	Nayagaon ...	1 0 0	1 0 0	1 0 0	8 15 8	5 5 4	3 10 4	9 12 2	3 0 0	6 12 2	20 4 6	6 0 0	5 0 0	1 0 0	3 2 0	9 6 0
9	Manik Khan	Baran ...	0 10 0	0 10 0	0 20 0	3 32 4	2 7 0	1 25 4	4 14 2	1 8 0	4 6 2	26 5 0	3 0 0	1 20 0	1 20 0	4 11 0	26 2 0
10	Keramatali	Munda ...	0 5 0	0 5 0	0 10 0	0 32 8	0 15 0	0 17 8	1 4 0	0 12 0	0 8 0	6 0 0	1 30 0	1 10 0	0 20 0	1 9 0	18 12 0
11	Hariday Mondal	Katara ...	0 10 0	0 10 0	0 20 0	4 12 0	3 2 4	1 9 12	3 11 9	1 8 0	2 3 9	13 6 6	3 30 0	3 10 0	0 20 0	1 9 0	9 6 0
12	Panchkowri Manda	Do. ...	0 0 0	0 7 0	0 20 0	4 17 8	2 1 8	2 16 0	7 3 2	1 8 0	5 11 2	34 3 0	3 10 0	2 0 0	1 10 0	3 14 6	21 7 0
13	Sagir Mahmud	Markoon ...	0 10 0	0 10 0	0 20 0	3 15 0	1 30 4	1 24 12	5 1 9	1 8 0	3 9 9	21 10 6	2 20 0	2 0 0	0 20 0	1 9 0	9 6 0
14	Ibrahim	Khilgaon ...	1 0 0	1 0 0	1 0 0	6 19 0	4 13 0	2 6 0	6 7 2	3 0 0	3 7 2	10 5 6	4 5 0	3 0 0	1 5 0	3 8 3	10 8 9
15	Yakub Khan, I	Do. ...	1 0 0	1 0 0	1 0 0	7 12 0	5 11 0	2 1 0	6 1 3	3 0 0	3 1 3	9 3 9	...	...	...	...	...
16	,, II	Do. ...	1 10 0	1 10 0	1 20 0	7 24 0	5 3 0	2 18 0	7 5 7	4 8 0	2 13 7	5 11 2	5 10 0	4 0 0	1 10 0	3 4 6	7 13 0

EFFECT OF BONEMEAL APPLIED IN 1912.

1	Hari Charan Mondal	Chatar ...	0 10 0	0 10 0	0 20 0	4 20 0	2 31 0	1 29 0	5 2 10	1 8 0	3 10 10	22 3 0	.....	.....	.....	.....	.....
2	Pyari Mohan Mondal	Ditto ...	0 7 0	0 7 0	0 14 0	2 19 0	1 28 0	0 31 0	2 5 3	1 0 9	1 4 6	10 15 0	.....	.....	.....	.....	.....
3	Rajkumar Sirkar	Ditto ...	0 10 0	0 10 0	0 20 0	4 27 0	2 12 0	2 15 0	7 2 0	1 8 0	5 10 0	33 12 0	.....	.....	.....	.....	.....
4	Pitambar Mondal	Ditto ...	0 10 0	0 10 0	0 20 0	3 16 0	2 11 6	1 5 0	3 6 0	1 8 0	1 14 0	11 4 0	.....	.....	.....	.....	.....
5	Murali Barui	Ditto ...	0 10 0	0 10 0	0 20 0	4 21 0	3 11 0	1 10 0	3 12 0	1 8 0	2 4 0	13 8 0	.....	.....	.....	.....	.....
6	Dengur Mondal	Ditto ...	0 7 0	0 7 0	0 14 0	3 8 0	2 0 0	1 8 0	3 9 0	1 0 9	2 8 3	21 14 0	.....	.....	.....	.....	.....
7	Sasi Kumar Sen	Khilgaon ...	1 0 0	1 0 0	1 0 0	5 30 0	4 10 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	.....	.....	.....	.....	.....

RESIDUAL EFFECT OF ABOVE.

						1913.					1914.				
1	Hari Charan Mondal	Chatra ...	0 10 0	0 10 0	...	3 21 0	2 12 0	1 9 0	3 10 10	...	3 10 10	22 1 0	3 20 0	2 0 0	1 20 0	4 11 0	26 2 0
2	Pyari Mohan Mondal	Ditto ...	0 7 0	0 7 0	...	2 19 0	1 37 0	0 22 0	1 10 5	...	1 10 5	14 2 6	2 0 0	1 20 0	0 20 0	1 9 0	13 8 0
3	Raj Kumar Sirkar	Ditto ...	0 10 0	0 10 0	...	3 3 0	1 15 0	1 28 0	5 1 7	...	5 1 7	30 9 6	2 10 0	1 20 0	0 30 0	2 5 6	14 1 0
4	Pitambar Mondal	Ditto ...	0 10 0	0 10 0	...	3 11 0	2 5 0	1 6 0	3 7 2	...	3 7 2	20 11 0	...	...	...	...	...
5	Murali Barui	Ditto ...	0 10 0	0 10 0	...	3 2 0	2 2 0	1 0 0	3 0 0	...	3 0 0	18 0 0	3 0 0	2 25 0	0 15 0	1 2 9	7 0 6
6	Dengur Mondal	Ditto ...	0 7 0	0 7 0	...	2 7 0	1 17 0	0 30 0	2 4 0	...	2 4 0	19 5 0	2 10 0	1 30 0	0 20 0	1 9 0	13 8 0
7	Sasi Kumar Sen	Khi'gaon ...	2 0 0	2 0 0	...	10 30 0	6 20 0	4 10 0	12 12 0	...	9 12 0	14 10 0	8 0 0	7 0 0	1 0 0	3 2 0	4 11 0

APPENDIX V—*concld.*

EFFECT OF BONEMEAL APPLIED IN 1911.

Dacca—concld.

No.	NAME OF CULTIVATOR.	Village.	AREA OF LAND.		Quantity of manure.	1911.							RESIDUAL EFFECT.								
						OUTTURN.		Difference of outturn.	Price of outturn.	Cost of manure.	PROFIT.		1912.					1913.			
													OUTTURN (1912).		Difference of outturn.	PROFIT.		OUTTURN (1913).		Difference of outturn.	PROFIT.	
			Manured.	Unmanured.		Manured.	Unmanured.				Per plot.	Per acre.	Manured.	Unmanured.		Per plot.	Per acre.	Manured.	Unmanured.		Per plot.	Per acre.
			B. K. C.	B. K. C.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.
1	Shaikh Kalim ...	.....	0 9 14	0 9 11	0 19 12	2 5 0	0 7 8	1 37 8	5 14 0	1 7 6	4 6 6	26 8 9	4 27 8	4 25 1	0 2 7	...	...	4 20 0	4 12 0	0 8 0	0 9 9	1 3 0
2	,, Golamali ...	.....	0 12 12	0 13 5½	0 25 8	5 0 0	2 13 1	2 26 15	8 0 3	1 14 6	6 1 9	29 0 3	4 8 8	3 14 3	0 34 5	2 9 3	12 1 3	4 2 6	3 15 0	0 27 6	2 0 0	1 7 6
3	Gabu	.....	0 3 9	0 4 11	0 7 2	1 14 8	0 34 15	0 19 11	1 7 3	0 8 6	0 14 9	17 8 3	1 20 2	1 20 0	0 0 2	...	...	1 15 0	1 10 0	0 5 0	0 6 0	6 12 0
4	Samiruddin ...	.....	0 5 4	0 5 8	0 10 8	2 25 0	1 26 11	0 38 7	2 1 5	0 12 6	1 4 11	15 9 9	3 6 0	2 25 0	0 21 0	1 9 0	18 3 8	2 20 0	2 2 0	0 18 0	1 5 9	15 8 6
5	Haribasi Modal ...	.....	0 9 3	0 8 14	0 18 6	4 31 0	1 23 0	3 8 0	9 9 6	1 6 0	8 3 6	54 12 6	4 20 12	4 20 0	0 0 12	...	...	5 0 0	3 25 0	1 15 0	4 2 0	27 6 6
6	Gafur	... ..	0 3 6	0 5 2	0 6 12	1 33 0	1 4 12	0 28 4	2 1 10	0 8 0	1 9 10	29 1 0	1 31 0	1 8 11	0 23 9	1 14 9	37 5 0	2 2 0	1 30 0	0 12 0	0 14 6	14 8 0
7	Golamali	.....	0 8 14	0 8 11	0 17 12	3 0 0	2 11 15	0 28 1	2 1 7	1 5 3	0 12 4	5 5 4	3 5 1	4 8 8	0 36 9	2 11 9	17 12 6	5 0 0	4 2 0	0 33 0	2 13 6	19 13 6
8	Ismai Khan ...	.....	0 8 4	0 11 2	0 16 8	5 0 0	3 17 3	1 22 13	4 11 5	1 3 9	3 7 8	25 3 3	3 12 0	3 3 13	0 8 3	0 10 0	4 8 6	3 4 0	2 37 0	0 7 0	0 7 9	3 6 3
9	Shaikh Kalim ...	.....	0 8 10	0 9 0	0 17 4	3 10 0	...	...	...	1 4 9	...	...	4 30 0	3 23 13	1 6 4	3 7 6	24 7 6	4 20 0	3 22 0	0 38 0	2 13 6	19 14 6
10	,, Rahim Bux	.....	0 9 2	0 8 8	0 18 4	3 20 0	2 32 11	0 27 5	4 0 9	1 5 9	0 11 0	4 9 6	5 0 0	3 30 4	1 9 12	3 11 8	24 8 6	4 35 0	3 27 0	1 8 0	3 9 9	23 7 3
11	Chandra Badan Sing.	.....	0 13 12	0 8 12	0 27 8	5 10 0	3 34 11	1 15 5	2 2 5	2 1 0	2 1 5	9 6 4	7 20 0	6 0 10	1 9 6	3 11 6	16 12 6	7 2 0	5 35 0	1 7 0	3 7 9	15 11 0
12	Jayhari Mondal ...	.. ...	0 6 13	0 6 15	0 13 10	3 32 0	2 38 13	0 33 3	2 7 3	1 0 6	1 6 9	14 1 0	3 30 0	3 7 10	0 22 6	1 10 6	15 11 9	3 3 0	2 35 0	0 8 0	0 9 9	5 7 9
13	Felu Christian ...	.....	0 4 0	0 4 0	0 8 0	2 13 0	1 29 3	0 23 13	1 12 6	0 9 6	1 3 0	17 13 0	2 24 0	2 0 0	0 21 0	1 12 6	26 11 0	2 8 0	1 33 0	0 15 0	1 2 0	16 14 0
14	Shaikh Jatru ...	.....	0 5 4	0 5 8	0 10 8	2 26 0	1 37 6	0 28 10	2 2 4	0 12 6	1 5 10	15 14 9	2 26 0	1 37 10	0 28 6	2 2 3	24 14 9	2 7 0	1 33 0	0 14 0	1 0 9	12 0 3
15	Lakshmi Sirdar ...	.....	0 5 4	0 5 4	0 10 8	1 23 0	0 25 14	0 37 2	2 12 6	0 12 6	2 0 0	23 5 4	2 10 0	...	...	...	...	2 2 0	1 25 0	0 17 0	1 4 5	14 10 3

EFFECT OF BONEMEAL APPLIED IN 1912.

Mymensingh.

No.	NAME OF CULTIVATOR.	Village.	AREA.		MANURE.		1912.						RESIDUAL EFFECT.								
							OUTTURN.		Difference of outturn.	Price of outturn.	PROFIT.		1913.					1914.			
													OUTTURN.		Difference of outturn.	PROFIT.		OUTTURN.		Difference of outturn.	PROFIT.	
			Manured plot.	Unmanured plot.	Quantity.	Cost.	Manured plot.	Unmanured plot.			Per plot.	Per acre.	Manured plot.	Unmanured plot.		Per plot.	Per acre.	Manured plot.	Unmanured plot.		Per plot.	Per acre.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
			B. K. C.	B. K. C.	Mds. S. C.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.
1	Kashimuddin ...	Digarkandi ...	0 10 0	0 10 0	0 20 0	1 8 0	2 37 8	1 24 0	1 13 8	4 0 2	2 8 2	15 1 0	3 30 0	2 10 0	1 20 0	4 8 0	27 0 0	3 10 0	2 35 0	0 15 0	1 2 0	6 12 0
2	Latif Bepari ...	Bolashpur ...	0 8 0	0 8 0	0 16 0	1 3 0	2 5 0	1 7 8	0 37 8	2 13 0	1 9 9	12 1 0	2 5 0	1 30 0	0 15 0	1 2 0	8 7 0	2 0 0	1 30 0	0 10 0	0 12 0	5 10 0
3	Alam Khan ...	Mashlakhali...	0 10 0	0 10 0	0 20 0	1 8 0	2 2 0	1 3 0	0 39 0	2 14 9	1 6 9	8 8 6	3 30 0	2 25 0	1 5 0	3 6 0	20 14 0	3 29 0	2 35 0	0 25 0	1 14 0	11 4 0
4	Tazimuddin ...	Lamapara ...	0 12 0	0 12 0	0 24 0	1 13 0	2 30 0	1 14 0	1 5 0	3 6 0	1 9 0	7 13 0	4 10 0	3 15 0	0 35 0	2 8 0	12 8 0	4 0 0	3 20 0	0 20 0	1 8 0	7 8 0
5	Anu Sircar ...	Digarkandi ...	0 10 0	0 10 0	0 20 0	1 8 0	3 39 0	1 35 0	1 35 0	5 10 0	4 2 0	24 12 0	3 5 0	2 35 0	0 10 0	0 12 0	4 8 0	2 35 0	2 30 0	0 5 0	0 6 0	2 4 0
6	Samir Mondal ...	Lamapara ...	0 8 0	0 8 0	0 16 0	1 3 0	1 17 0	0 30 0	0 27 0	2 0 4	0 13 0	6 4 0	3 10 0	2 0 0	1 10 0	3 12 0	28 9 0	2 20 0	2 10 0	0 20 0	1 8 0	11 4 0
7	Bazulal Das ...	Mashkandi ...	0 7 0	0 7 0	0 14 0	1 0 9	2 20 0	1 25 0	0 35 0	2 10 0	1 9 3	13 8 6	2 25 0	1 30 0	1 5 0	3 6 0	28 9 0	2 20 0	2 5 0	0 15 0	1 2 0	9 10 0
8	Meher Khan ...	Banshi ...	0 10 0	0 10 0	0 20 0	1 8 0	1 9 0	1 0 0	0 9 0	0 10 0	...	...	2 35 0	1 30 0	1 5 0	3 6 0	20 4 0	4 5 0	2 35 0	1 10 0	3 12 0	22 8 0
9	Naimuddin Sircar	Singhjani ...	0 10 0	0 10 0	0 20 0	1 8 0	3 0 0	2 0 0	1 0 0	3 0 0	1 8 0	9 0 0	3 5 0	2 10 0	0 35 0	2 8 0	15 0 0	3 30 0	3 5 0	0 25 0	1 14 0	11 4 0
10	Girish Chandra Chowdhury.	Do. ...	0 10 0	0 10 0	0 20 0	1 8 0	2 30 0	2 6 8	0 23 8	1 12 3	0 4 3	1 9 6	3 5 0	2 15 0	0 30 0	2 4 0	13 8 0	3 30 0	3 5 0	0 25 0	1 14 0	11 4 0
11	Jaimat Shaikh ...	Fulbaria ...	0 10 0	0 10 0	0 20 0	1 8 0	1 25 0	1 18 8	0 6 8	0 7 9	...	...	3 20 0	2 35 0	0 25 0	1 14 0	11 4 0	4 5 0	3 0 0	1 5 0	3 6 0	20 4 0
12	Mohesh Chandra Dey	Kuchgar ...	0 10 0	0 10 0	0 20 0	1 8 0	2 0 0	1 26 8	0 13 8	1 0 3	...	...	3 35 0	3 0 0	0 35 0	2 8 0	15 0 0	3 30 0	3 10 0	0 20 0	1 8 0	9 0 0

APPENDIX VI.

MYMENSINGH.

Residual effect of Bonemeal applied in 1913.

No.	Name of cultivator.	Village.	Area of land.		Quantity of manure.	Outturn (1913).		Difference of outturn.	Price of outturn.	Cost of manure.	Profit.		Outturn (1914).		Difference of outturn.	Profit.	
			Manured.	Unmanured.		Manured.	Unmanured.				Per plot.	Per acre.	Manured.	Unmanured.		Per plot.	Per acre.
			B. K. C.	B. K. C.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	RS. A. P.	RS. A. P.
1	Setu Mandal	Golgonda	1 0 0	1 0 0	1 0 0	9 0 0	8 0 0	1 0 0	3 0 0	3 0 0	...	...	2 25 0	8 5 0	1 20 0	4 8 0	13 8 0
2	Imamali Sircar	Akna	0 12 0	0 12 0	0 24 0	4 15 0	4 0 0	0 15 0	1 2 0	1 12 3	...	...	5 0 0	4 0 0	1 0 0	3 0 0	15 0 0
3	Shaikh Ismail Munshi	Do.	0 15 0	0 15 0	0 30 0	5 15 0	43 5 0	0 28 0	1 8 0	2 4 0	...	..	6 20 0	5 0 0	1 20 0	4 8 0	18 0 0
4	Dengu Shaikh	Do.	1 0 0	1 0 0	1 0 0	8 0 0	5 30 12	2 9 4	6 11 0	3 0 0	3 11 0	11 1 0	9 0 0	7 10 0	1 30 0	5 4 0	15 12 0
5	Setu Mandal	Golgonda	0 16 0	0 16 0	0 32 0	5 0 0	4 0 0	1 0 0	3 0 0	2 6 6	0 9 6	2 2 6	6 20 0	5 10 0	1 10 0	3 12 0	14 1 0
6	Shaikh Jamir	Akna	0 12 0	0 12 0	0 24 0	4 0 0	4 0 0	...	...	3 0 0	...	...	5 0 0	4 0 0	1 0 0	3 0 0	15 0 0
7	Kapitulla Tarapdar	Jorbari	0 10 0	0 10 0	0 20 0	4 3 0	3 10 0	0 33 0	2 7 6	1 8 0	0 15 6	5 13 0	5 0 0	4 0 0	1 0 0	3 0 0	18 0 0
8	Alep Khan	Do.	0 16 0	0 16 0	0 32 0	6 27 0	4 18 0	2 9 0	6 10 6	2 6 6	3 4 0	12 3 0	7 0 0	5 10 0	1 32 0	5 4 0	19 11 0
9	Azim Khan	Do.	0 19 0	0 19 0	0 38 0	6 9 0	4 22 0	1 27 0	5 0 6	2 13 6	2 3 0	6 14 3	6 20 0	5 0 0	1 20 0	4 8 0	14 3 4
10	Ashan Mandal	Do.	0 7 0	0 7 0	0 14 0	3 30 0	2 1 0	1 29 0	5 2 9	1 0 9	4 2 0	35 5 6	4 0 0	3 0 0	1 0 0	3 0 0	25 11 6
11	Shamsher Khan	Do.	0 17 0	0 17 0	0 34 0	6 3 0	4 11 0	2 32 0	8 6 3	2 8 9	5 13 6	20 10 0	6 30 0	5 0 0	1 30 0	5 4 0	18 8 6
12	Jarip Khan	Do.	0 10 0	0 10 0	0 20 0	4 1 0	3 3 0	0 38 0	2 13 7	1 8 0	1 5 7	8 1 6	4 35 0	3 0 0	1 35 0	5 10 0	33 12 0
13	Ismail Khan	Do.	0 13 0	0 13 0	0 26 0	5 5 0	3 23 0	1 22 0	4 8 3	1 15 0	2 9 3	12 7 0	5 35 0	4 35 0	1 0 0	3 0 0	13 13 6
14	Abbas Sircar	Do.	1 3 0	1 3 0	1 6 0	9 1 0	7 9 0	1 32 0	5 6 5	3 7 3	1 15 2	5 1 6	9 35 0	8 0 0	1 35 0	5 10 0	14 10 9
15	Kanu Mandal	Do.	0 16 0	0 16 0	0 32 0	8 6 0	6 9 0	1 37 0	5 12 3	2 6 6	3 5 9	12 9 6	8 25 0	7 0 0	1 25 0	4 14 0	18 4 6
16	Alimaddin Mandal	Do.	0 13 0	0 13 0	0 26 0	3 27 0	1 2 0	2 25 0	7 14 0	1 15 9	5 14 3	27 3 9	4 20 0	3 0 0	1 20 6	4 8 0	2 1 3
17	Ahamed Khan	Do.	1 0 0	1 0 0	1 0 0	9 17 0	5 38 0	3 19 0	10 6 6	3 0 0	7 6 6	22 3 6	9 0 0	7 0 0	2 0 0	6 0 0	18 0 0
18	Alijan Shaikh	Muktagacha	1 0 0	1 0 0	1 0 0	5 10 0	3 20 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	5 0 0	3 0 0	2 0 0	6 0 0	21 0 0
19	Macha Shaikh	Ditto	1 0 0	1 0 0	1 0 0	4 20 0	3 20 0	1 0 0	3 0 0	3 0 0	...	...	8 25 0	6 20 0	2 5 0	6 6 0	19 2 0
20	Jagat Chandra Gope	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	5 5 0	1 35 0	5 10 0	3 0 0	2 10 0	7 14 0	7 30 0	6 0 0	1 30 0	5 4 0	15 12 0
21	Jagat Chandra Gope	Ditto	1 0 0	1 0 0	1 0 0	8 0 0	6 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	8 35 0	7 0 0	1 25 0	5 10 0	15 14 0
22	Jadu Shaikh	Ditto	1 0 0	1 0 0	1 0 0	8 0 0	5 30 0	2 10 0	6 12 0	3 0 0	3 12 0	11 4 0	8 20 0	6 25 0	1 35 0	5 10 0	16 14 0
23	Abdul Sircar	Ditto	0 18 0	0 18 0	0 36 0	3 14 0	3 4 0	0 10 0	0 12 0	2 11 3	...	...	4 30 0	3 0 0	1 20 0	4 8 0	15 0 0
24	Harmatali	Dhala	0 10 0	0 10 0	0 20 0	5 10 0	4 0 0	1 10 0	3 12 0	1 8 0	2 4 0	13 8 0	5 35 0	5 0 0	0 35 0	2 10 0	15 12 0
25	Akmashali Fakir	Do.	0 5 0	0 5 0	0 10 0	3 0 0	2 8 0	0 32 0	2 6 0	0 12 0	1 10 0	19 8 0	3 20 0	2 30 0	0 30 0	2 4 0	27 0 0
26	Jhora Shaikh	Do.	0 15 0	0 15 0	0 30 0	7 0 0	5 25 0	1 15 0	4 2 0	2 4 0	1 14 0	7 8 0	7 25 0	6 0 0	1 25 0	4 14 0	19 8 0
27	Kamala Kanta Dey	Do.	0 7 8	0 7 8	0 15 0	5 0 0	3 20 0	1 20 0	4 8 0	1 2 0	3 6 0	27 0 0	5 20 0	4 30 0	0 30 0	2 4 0	19 4 7
28	Abdul Shaikh	Do.	0 7 8	0 7 8	0 15 0	4 30 0	3 0 0	1 30 0	5 4 0	1 2 0	4 2 0	33 0 0	5 0 0	4 0 0	1 0 0	3 0 0	25 11 7
29	Fulchand Paramanik	Baliadi	0 6 0	0 6 0	0 12 0	2 26 0	1 30 0	0 30 0	2 4 0	0 14 6	1 5 6	13 7 0	3 0 0	2 0 0	1 0 0	3 0 0	30 0 0
30	Sitaram Mandal	Do.	0 6 0	0 6 0	0 12 0	3 0 0	2 0 0	1 0 0	3 0 0	0 14 6	2 1 6	20 15 0	3 20 0	2 20 0	1 0 0	3 0 0	30 0 0
31	Taribulla Shaikh	Do.	0 8 0	0 8 0	0 16 0	5 0 0	3 0 0	2 0 0	6 0 0	1 3 3	4 12 9	35 15 6	5 25 0	4 25 0	1 0 0	3 0 0	11 4 0
32	Matiram Jamadar	Do.	0 18 0	0 18 0	0 36 0	9 0 0	7 8 0	1 32 0	5 6 0	2 11 3	2 10 9	9 5 6	9 30 0	8 0 0	1 30 0	5 4 0	17 8 0
33	Kitabdi	Do.	0 4 0	0 4 0	0 8 0	3 0 0	1 35 0	1 5 0	3 6 0	0 9 6	2 12 6	41 11 6	3 25 0	2 35 0	0 30 0	2 4 0	33 12 0
34	Ali Mandal	Guziam	0 8 8	0 8 8	0 17 0	2 30 0	2 0 0	0 30 0	2 4 0	1 4 6	0 15 6	6 12 9	3 0 0	2 0 0	1 0 0	3 0 0	22 8 0
35	Panchu Shaikh	Ditto	0 9 8	0 9 8	0 19 0	2 0 0	1 0 0	1 0 0	3 0 0	1 6 6	1 9 6	10 8 3	2 18 0	1 13 0	1 5 0	3 6 0	22 8 0
36	Dali Moral	Ditto	1 3 0	1 3 0	1 6 0	6 30 0	6 30 0	...	...	3 7 3	...	...	7 0 0	5 0 0	2 0 0	6 0 0	15 10 6
37	Mohesh Ch. Chowdhury	Ramgopalpur... ...	1 0 0	1 0 0	1 0 0	5 20 0	5 0 0	0 20 0	1 8 0	3 0 0	...	...	6 0 0	4 10 0	1 30 0	5 4 0	15 12 0
38	Satish Ch. Dutta	Ditto	1 4 0	1 4 0	1 8 0	3 10 0	3 0 0	0 10 0	0 12 0	3 10 0	...	...	3 25 0	2 0 0	1 25 0	4 14 0	16 4 0
39	Bepin Ch. Das	Ditto	0 18 0	0 18 0	0 36 0	3 15 0	3 0 0	0 15 0	1 2 0	2 7 6	...	...	3 30 0	2 0 0	1 30 0	5 4 0	32 2 0
40	Shaikh Somedali	Ditto	0 12 0	0 12 0	0 24 0	3 15 0	3 0 0	0 15 0	1 2 0	1 12 0	...	...	3 35 0	2 15 0	1 20 0	4 8 0	22 8 0
41	Chabi Shaikh	Bailar	0 14 0	0 14 0	0 28 0	6 5 0	4 33 0	1 12 0	3 14 0	2 1 6	1 13 0	7 12 6	7 20 0	6 0 0	1 20 0	4 8 0	9 10 3
42	Hanif Bepari	Do.	0 10 0	0 10 0	0 20 0	5 0 0	4 0 0	1 0 0	3 0 0	1 8 0	1 8 0	9 0 0	5 20 0	4 10 0	1 20 0	3 12 0	22 8 0
43	Izat Shaikh	Do.	1 0 0	1 0 0	1 0 0	7 5 0	5 0 0	2 5 0	6 6 0	3 0 0	3 6 0	10 2 0	7 15 0	5 15 0	2 0 0	6 0 0	18 0 0
44	Ditto	Do.	1 0 0	1 0 0	1 0 0	8 0 0	6 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	8 5 0	6 10 0	1 35 0	3 10 0	10 14 0
45	Kaimulla Sircar	Do.	0 15 0	0 15 0	0 30 0	6 30 0	5 0 0	1 30 0	5 4 0	2 4 0	3 0 0	12 0 0	7 0 0	5 20 0	1 20 0	4 8 0	18 0 0
46	Mianjan Shaikh	Jamalpur	2 5 0	2 5 0	2 10 0	24 0 0	20 0 0	4 0 0	12 0 0	6 12 0	5 4 0	6 15 9	14 0 0	11 20 0	3 20 0	10 8 0	14 0 0
47	Rajabali	Ditto	2 0 0	2 0 0	2 0 0	26 0 0	20 0 0	6 0 0	18 0 0	6 0 0	12 0 0	18 0 0	17 10 0	15 5 0	3 5 0	6 6 0	9 9 0
48	Mahamedali Shaikh	Ditto	2 0 0	2 0 0	2 0 0	16 0 0	9 0 0	7 0 0	21 0 0	6 0 0	15 0 0	22 8 0	16 35 0	14 0 0	2 35 0	8 10 0	12 15 0
49	Sonamunshi Shaikh	Ditto	0 9 0	0 9 0	0 18 0	5 0 0	3 0 0	2 0 0	6 0 0	1 5 7	4 10 5	31 0 0	5 20 0	4 20 0	1 0 0	3 0 0	20 0 0
50	Shagar Shaikh	Ditto	0 10 0	0 10 0	0 20 0	6 0 0	4 0 0	2 0 0	6 0 0	1 8 0	4 8 0	27 0 0	6 15 0	4 30 0	1 25 0	4 14 0	29 4 0
51	Mabu Shaikh	Ditto	0 10 0	0 10 0	0 20 0	6 20 0	5 0 0	1 20 0	4 8 0	1 8 0	3 0 0	18 0 0	6 35 0	5 5 0	1 30 0	5 4 0	31 12 0
52	Abdul Rahan Sircar	Gaffargaon	0 10 0	0 10 0	0 20 0	5 37 0	3 32 0	2 5 0	6 6 0	1 8 0	4 14 0	29 4 0	5 10 0	4 10 0	1 0 0	3 0 0	18 0 0

APPENDIX VI—*contd.*

MYMENSINGH—*concld.*

Residual effect of bonemeal applied in 1913.

No.	NAMES OF CULTIVATORS.	Village.	AREA OF LAND.		Quantity of manure.	OUTTURN (1913).		Difference of outturn.	Price of outturn.	Cost of manure.	PROFIT.		OUTTURN (1914).		Difference of outturn.	PROFIT.	
			Manured.	Unmanured.		Manured.	Unmanured.				Per plot.	Per acre.	Manured.	Unmanured.		Per plot.	Per acre.
			B. K. C.	B. K. C.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Mds. S. C.	RS. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Mds. S. C.	Rs. A. P.	Rs. A. P.
53	Kudratulla Fakir	Gaffargaon	0 10 0	0 10 0	0 20 0	5 15 0	3 36 0	1 19 0	4 6 6	1 8 0	2 14 6	17 7 0	5 30 0	4 35 0	0 35 0	2 10 0	15 12 0
54	Shaikh Azim	Ditto	1 3 0	1 3 0	1 6 0	8 24 0	7 3 0	1 21 0	4 9 0	3 6 0	1 3 0	3 1 6	9 0 0	7 10 0	1 30 0	5 4 0	13 11 0
55	Kalim Mir Shikari	Ditto	0 12 0	0 12 0	0 24 0	5 28 0	4 32 0	0 36 0	2 11 0	1 12 0	0 15 0	4 11 0	6 0 0	5 0 0	1 0 0	3 0 0	15 0 0
56	Joynatali Shaikh	Ditto	2 5 0	2 5 0	2 10 0	25 3 0	17 0 0	8 3 0	24 3 6	7 12 0	17 7 6	23 4 9	15 23 0	13 8 0	2 15 9	7 2 0	10 11 0
57	Sovan Goloudas	Ditto	1 4 0	1 4 0	1 8 0	16 18 0	12 18 0	4 0 0	12 0 0	3 10 0	8 6 0	20 15 0	16 30 0	15 0 0	1 30 0	5 4 0	15 12 0
58	Abdul Sircar	Ditto	1 0 0	1 0 0	1 0 0	10 30 0	8 26 0	2 4 0	6 4 9	3 0 0	3 4 9	9 14 3	11 0 0	9 25 0	1 15 0	4 2 0	12 6 0
59	Shaikh Abdul	Ditto	2 2 0	2 2 0	2 4 0	20 10 0	14 30 0	5 20 0	16 8 0	6 6 0	10 2 0	14 7 6	16 30 0	13 0 0	3 30 0	11 4 0	16 14 0
60	Darika Nath Sircar	Bahadurpur	1 0 0	1 0 0	1 0 0	11 0 0	5 28 0	5 12 0	15 13 0	3 0 0	12 13 0	38 7 0	11 15 0	9 30 0	1 25 0	4 14 0	14 10 0
61	Mahamed Ismail Sircar	Ditto	1 1 0	1 1 0	1 2 0	9 0 0	6 12 0	2 28 0	8 [illegible] 0	3 2 0	4 15 0	14 1 9	9 20 0	8 0 0	1 20 0	4 8 0	13 8 0
62	Ishan Ch. Shir	Ditto	1 0 0	1 0 0	1 0 0	9 0 0	6 10 0	2 30 0	8 4 0	3 0 0	5 4 0	15 12 0	9 25 0	8 0 0	1 25 0	4 14 0	14 10 0
63	Samir Jaigirder	Ditto	1 0 0	1 0 0	1 0 0	11 0 0	5 20 0	5 20 0	16 8 0	3 0 0	13 8 0	40 8 0	10 20 0	8 10 0	2 10 0	6 12 0	20 4 0
64	Alapali Shaikh	Ditto	1 0 0	1 0 0	1 0 0	8 0 0	5 0 0	3 0 0	9 0 0	3 0 0	6 0 0	18 0 0	8 20 0	7 0 0	1 20 0	4 14 0	14 10 0
65	Maka Shaikh	Ditto	1 0 0	1 0 0	1 0 0	10 0 0	5 30 0	4 10 0	12 12 0	3 0 0	9 12 0	29 4 0	10 25 0	8 35 0	1 30 0	5 4 0	15 12 0
66	Jamir Shaikh	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	5 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	7 20 0	6 0 0	1 20 0	4 8 0	13 8 0
67	Jamir Shaikh	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	4 0 0	3 0 0	9 0 0	3 0 0	6 0 0	18 0 0	7 25 0	6 0 0	1 25 0	4 14 0	14 10 0
68	Naru Shaikh	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	5 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	7 30 0	6 0 0	1 30 0	5 4 0	15 12 0
69	Suli Shaikh	Ditto	1 0 0	1 0 0	1 0 0	11 0 0	7 30 0	3 10 0	9 12 0	3 0 0	6 12 0	20 4 0	11 15 0	9 35 0	1 20 0	4 8 0	13 8 0
70	Chaugin Garow	Ditto	1 0 0	1 0 0	1 0 0	7 30 0	6 0 0	1 30 0	5 4 0	3 0 0	2 4 0	6 12 0	8 0 0	5 15 0	2 25 0	7 14 0	23 10 0
71	Sutar Shaikh	Ditto	0 10 0	0 10 0	0 20 0	5 0 0	2 0 0	3 0 0	9 0 0	1 8 0	7 8 0	45 0 0	5 10 0	4 0 0	1 10 0	3 12 0	22 8 0
72	Nitai Hadi	Ditto	1 0 0	1 0 0	1 0 0	7 30 0	3 0 0	4 30 0	14 4 0	3 0 0	11 4 0	33 12 0	8 0 0	5 5 0	2 35 0	8 10 0	25 14 0
73	Kashi Nath Sircar	Ditto	1 0 0	1 0 0	1 0 0	7 30 0	5 0 0	2 30 0	8 4 0	3 0 0	5 4 0	15 12 0	8 0 0	6 0 0	2 0 0	6 0 0	18 0 0
74	Shaber Jamadar	Baigunbari	1 0 0	1 0 0	1 0 0	8 0 0	4 6 0	3 24 0	10 12 0	3 0 0	7 12 0	23 4 0	8 15 0	3 35 0	1 20 0	4 8 0	13 8 0
75	Nasiruddin Shaikh	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	5 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	7 10 0	5 5 0	2 5 0	6 6 0	19 2 0
76	Hem Chandra Dutta	Ditto	1 0 0	1 0 0	1 0 0	6 20 0	4 0 0	2 20 0	7 8 0	3 0 0	4 8 0	13 8 0	6 30 0	5 0 0	1 30 0	5 4 0	15 12 0
77	Shajan Mandal	Ditto	1 0 0	1 0 0	1 0 0	8 30 0	5 36 0	2 34 0	8 8 0	3 0 0	5 8 0	16 8 0	9 0 0	7 0 0	2 0 0	6 0 0	18 0 0
78	Inatulla Munshi	Ditto	1 0 0	1 0 0	1 0 0	8 20 0	8 0 0	0 20 0	1 8 0	3 0 0	...	...	8 35 0	7 0 0	1 35 0	5 10 0	16 14 0
79	Rahamatulla Munshi	Ditto	1 2 0	1 2 0	1 4 0	7 0 0	5 0 0	2 0 0	6 0 0	3 4 0	2 12 0	7 8 0	7 10 0	5 10 0	2 0 0	6 0 0	16 5 6
80	Shahar Mandal	Ditto	1 0 0	1 0 0	1 0 0	5 0 0	3 13 0	1 17 0	5 0 0	3 0 0	2 0 0	6 0 0	5 15 0	3 10 0	2 5 0	6 6 0	19 2 0
81	Sharup Mandal	Ditto	1 0 0	1 0 0	1 0 0	6 12 0	4 25 8	1 26 8	4 15 6	3 0 0	2 15 6	8 14 6	6 25 0	5 0 0	1 25 0	4 14 0	14 10 0
82	Jainat Fakir	Ditto	1 0 0	1 0 0	1 0 0	4 20 0	2 10 0	3 20 0	6 12 0	3 0 0	3 12 0	11 4 0	4 30 0	3 10 0	1 20 0	4 8 0	13 8 0
83	Khudi Mandal	Sharishabari	1 10 0	1 10 0	1 20 0	14 0 0	10 20 0	3 20 0	10 8 0	4 8 0	6 0 0	12 0 0	14 30 0	12 5 0	2 22 0	7 14 0	15 12 0
84	Azimuddin Sircar	Ditto	1 0 0	1 0 0	1 0 0	10 0 0	7 0 0	3 0 0	9 0 0	3 0 0	6 0 0	18 0 0	10 15 0	8 0 0	2 15 0	7 2 0	21 6 0
85	Sayedali Shaikh	Ditto	1 0 0	1 0 0	1 0 0	8 0 0	6 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	8 15 0	6 5 0	2 10 0	6 12 0	20 4 0
86	Solai Sircar	Ditto	0 10 0	0 10 0	0 20 0	3 0 0	2 0 0	1 0 0	3 0 0	1 8 0	1 8 0	9 0 0	3 20 0	2 0 0	1 20 0	4 8 0	27 0 0
87	Rafatulla Sircar	Ditto	0 10 0	0 10 0	0 20 0	3 0 0	2 0 0	1 0 0	3 0 0	1 8 0	1 8 0	9 0 0	3 15 0	1 30 0	1 25 0	4 14 0	29 4 0
88	Alep Shaikh	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	5 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	7 10 0	5 10 0	2 0 0	6 0 0	18 0 0
89	Sobedali Bhunja	Ditto	1 0 0	1 0 0	1 0 0	8 0 0	6 20 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	8 20 0	6 35 0	1 25 0	4 14 0	14 10 0
90	Tashir Mudi	Ditto	1 0 0	1 0 0	1 0 0	6 0 0	4 20 0	1 20 0	4 8 0	3 0 0	1 8 0	4 8 0	6 15 0	4 15 0	2 0 0	6 0 0	18 0 0
91	Khudi Fakir	Ditto	1 0 0	1 0 0	1 0 0	7 0 0	5 10 0	1 30 0	5 4 0	3 0 0	2 4 0	8 12 0	7 15 0	5 10 0	2 5 0	6 6 0	19 2 0
92	Shahebulla Sircar	Ditto	1 0 0	1 0 0	1 0 0	8 0 0	6 5 0	1 35 0	5 10 0	3 0 0	2 10 0	7 14 0	8 10 0	6 6 0	2 4 0	6 4 9	18 14 3
93	Ahamed Khan	Ditto	0 5 0	0 5 0	0 10 0	1 20 0	1 0 0	0 20 0	1 8 0	0 12 0	0 12 0	9 0 0	1 35 0	1 1 0	0 34 0	2 8 9	30 9 0
94	Kashi Shaikh	Ditto	1 0 0	1 0 0	1 0 0	9 0 0	6 0 0	3 0 0	9 0 0	3 0 0	6 0 0	18 0 0	9 10 0	7 0 0	2 10 0	6 12 0	20 4 0
95	Samir Mandal	Ditto	0 10 0	0 10 0	0 20 0	4 0 0	2 25 0	1 15 0	4 2 0	1 8 0	2 10 0	15 12 0	4 20 0	3 0 0	1 20 0	4 8 0	27 0 0
96	Pyarmamud Mridha	Trishal	1 0 0	1 0 0	1 0 0	8 25 0	4 33 0	3 31 0	11 6 0	3 0 0	8 6 0	25 2 0	9 0 0	7 0 0	2 0 0	6 0 0	18 0 0
97	Sayedali Sircar	Do.	1 0 0	1 0 0	1 0 0	9 10 0	5 10 0	4 0 0	12 0 0	3 0 0	9 0 0	27 0 0	9 20 0	9 10 0	2 10 0	6 12 0	29 4 0
98	Tazemuddin Mandal	Do.	1 0 0	1 0 0	1 0 0	8 0 0	6 0 0	2 0 0	6 0 0	3 0 0	3 0 0	9 0 0	8 10 0	6 10 0	2 0 0	6 0 0	18 0 0
99	Bhringu Shaikh	Do.	1 0 0	1 0 0	1 0 0	9 0 0	5 31 0	3 9 0	9 11 0	3 0 0	6 11 0	20 1 0	9 15 0	7 35 0	1 20 0	4 8 0	13 8 0
100	Baikanta Chandra Shil	Do.	1 0 0	1 0 0	1 0 0	8 35 0	5 10 0	3 25 0	10 14 0	3 0 0	7 14 0	23 10 0	9 10 0	7 15 0	1 35 0	5 10 0	16 14 0

APPENDIX VI.—*concld.*

DACCA.

Effect of Bonemeal and Lime on red soils.

No.	Names of cultivators.	Village.
1	Shaikh Surath Ali ...	... Koshkhana.
2	Shaikh Samirulla ...	... Companibag.
3	Shaikh Fazu ...	... Ditto.

EFFECT OF BONEMEAL AND LIME IN RED SOIL IN JULY 1915.

Mymensingh.

No.	NAME.	Village.	
1	Elahi Box	Kawraid ...	Crop on manured plot has a better appearance.
2	Jahar Ali Daftri	„ ...	

APPENDIX VII.

POTATO CULTIVATION, 1914.

Dacca.

No.	Names of cultivators.	Village.	Area of land.	Quantity of seed.	Outturn.	Price of outturn.	Cost of cultivation.	PROFIT. Per plot.	PROFIT. Per Acre.
1	2	3	4	5	6	7	8	9	10
			B. K. CH.	M. S. CH.	M. S. CH.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	Abdul Kadir Munshi ...	Jamnagar ...	0 18 0	6 0 0	36 15 0	90 15 0	75 8 0	15 7 0	51 7 8
2	Ahmad Munshi	Ditto ...	2 0 0	10 0 0	84 10 0	210 10 0	140 9 0	70 1 0	105 1 6
3	Amjatali Munshi ...	Ditto ...	2 0 0	6 0 0	79 25 0	199 2 10	96 7 0	102 11 10	154 1 9
4	Wahed Ali	Ditto ...	0 18 0	4 0 0	43 15 0	108 7 0	60 3 0	48 4 0	160 13 6
5	Munsoor Ali	Ditto ...	0 8 0	1 0 0	18 12 8	45 13 6	18 0 0	27 13 0	208 5 3
6	Subed Ali	Mirchapur ...	0 10 0	2 0 0	16 5 0	40 5 0	28 2 0	12 3 0	73 2 0
7	Juman Prodhan	Ditto ...	0 18 0	3 0 0	38 15 0	95 15 0	46 6 0	49 9 0	165 3 8
8	Madhu Prodhan	Mamdabad	0 18 0	3 0 0	39 10 8	98 3 6	47 9 0	41 10 6	138 13 8
9	Machu Prodhan	Ramnagar ...	1 0 0	4 0 0	52 10 0	130 10 0	58 6 0	72 4 0	216 12 0
10	Alam Bepari	Ditto ...	1 10 0	6 0 0	16 0 0	40 0 0	84 2 0	.....	.....
11	Ibrahim	Ditto ...	1 5 0	5 0 0	45 5 0	112 13 0	72 8 0	50 7 0	120 12 0
12	Madan Prodhan	Gagatia ...	0 5 0	1 0 0	9 20 0	23 12 0	15 6 0	8 6 0	100 8 0
13	Ismail	Huglakandi	0 5 0	1 0 0	8 2 0	20 2 0	15 9 0	4 9 0	54 12 0
14	Nijamaddi	Ditto ...	0 2 8	0 20 0	4 25 0	11 9 0	9 4 0	2 5 0	55 8 0
15	Samser Ali	Koroipur ...	0 6 0	1 0 0	8 20 0	21 4 0	16 2 0	5 2 0	51 4 0
16	Madbar	Mamurdi	0 6 0	1 0 0	3 35 0	9 11 0	13 0 0	.....	.....
17	Ekabbar	Ditto	0 6 0	1 0 0	4 5 0	10 5 0	12 8 0	.....	.....
18	Rahimuddi	Ditto	0 5 0	1 0 0	5 22 0	13 14 0	12 12 0	1 2 0	13 8 0
19	Sheik Ledu	Ditto	0 6 0	1 0 0	6 2 0	15 2 0	14 8 0	0 10 0	7 8 0
20	Ganga Charan Nath ...	Haribardi	0 7 0	1 0 0	3 12 0	8 4 0	12 14 0	.....	.....
21	Mahananda Mahato ...	Ditto	0 6 0	1 0 0	3 25 0	9 1 0	13 2 0	.....	.....
22	Hari Charan Nath	Ditto	0 6 0	1 0 0	4 25 0	11 9 0	14 3 0	.....	.....
23	Habibulla	Tundi	0 5 0	1 0 0	4 0 0	10 0 0	16 2 0	.....	.....
24	Abdul Gafur	Munuria ...	2 0 0	7 0 0	40 0 0	100 0 0	85 0 0	15 0 0	22 8 0
25	Karim Buksh...	Ditto ...	1 0 0	3 0 0	25 0 0	62 8 0	46 2 0	16 6 0	49 2 0
26	Advait Bepari	Ditto ...	5 0 0	15 0 0	112 0 0	280 0 0	210 3 0	69 13 0	41 15 10
27	Jilmchand	Ditto ...	0 12 0	2 0 0	18 0 0	45 0 0	36 10 0	8 6 0	41 14 0
28	Harchandra Bepari	Bentha ...	1 0 0	3 0 0	32 4 0	80 4 0	47 8 0	32 12 0	98 4 0
29	Charan Das	Do. ...	1 0 0	2 30 0	30 0 0	75 0 0	46 11 0	28 5 0	84 15 0
30	Raimohan Mandal	Deoli ...	2 0 0	6 0 0	40 20 0	107 4 0	82 10 0	18 10 0	27 15 0
31	Mocktal Hossein	Basalia ...	1 10 0	5 0 0	38 12 0	95 12 0	74 3 0	21 9 0	43 2 0
32	Gourchand Mondal	Chapra ...	1 0 0	3 0 0	28 0 0	70 0 0	43 14 0	21 2 0	63 6 0
33	Chunilal Mondal	Do. ...	0 15 0	2 10 0	22 20 0	56 4 0	40 7 0	15 13 0	63 4 0
34	Raj Kumar Sircar	Mandyle ...	0 7 0	0 20 0	5 3 0	12 11 0	11 3 0	1 8 0	12 14 0
35	Bochai Sirkar	Tegharia ...	1 10 0	4 20 0	37 10 0	92 8 0	69 13 0	22 11 0	45 6 0
36	Sadhu Charan Sidda ...	Akshail ...	0 10 0	1 15 0	5 4 0	12 12 0	16 11 0	.....	.....

Khas Mahal.

N.B.—The khasmahal officers at first made no arrangements with the cultivators and as such could not distribute the potatoes till very late in the season and the seeds were planted in rather unprepared soil, which is responsible for the bad result. The surface caterpillars also did considerable damage.

APPENDIX VII—*contd.*

POTATO CULTIVATION, 1914—*contd.*

Dacca—concld.

No.	Names of cultivators.	Village.	Area of land.	Quantity of seed.	Outturn.	Price of outturn.	Cost of cultivation and price of seed.	PROFIT.	
								Per plot.	Per acre.
1	2	3	4	5	6	7	8	9	10
			B. K. CH.	MDS. S. CH.	MDS. S. CH.	RS. A. P.	Rs. A. P.	RS. A. P.	RS. A. P.
37	Ganesh Sidda...	Akshail ...	0 4 0	0 20 0	4 3 0	10 3 0	8 7 0	1 13 0	27 3 10
38	Dasarath Barai	Krishnanagar	0 6 8	0 35 0	10 0 12	30 0 9	17 12 0	12 4 9	113 11 2
39	Jagannath Karmakar ...	Nisanbari ...	0 3 8	0 17 8	3 22 0	8 4 0	7 6 0	0 14 0	15 2 0
40	Raju Karmakar	Ditto ...	0 7 0	1 0 0	4 2 0	10 2 0	13 3 0	.....	.....
41	Rabidas Mandal	Ditto ...	0 6 8	1 0 0	7 3 0	17 11 0	13 6 0	4 5 0	39 12 11
42	Abhimanyu Gope	Ditto ...	1 18 0	5 0 0	29 0 12	72 8 9	69 8 0	3 0 9	4 5 5
43	Iswar Chandra Mandal ...	Guita ...	0 13 0	1 30 0	10 5 0	30 5 0	28 8 0	1 13 0	8 10 0
44	Krishna Charan Choukidar	Basabari ...	0 2 0	0 9 0	0 32 0	2 0 0	5 4 0	.....	.....
45	Suryanath Deb Sarma ...	Manipur ...	0 1 0	0 5 0	0 22 0	1 6 0	4 6 0	.....	.....
46	Probodh Chandra Chakravarty.	Ramna ...	0 2 0	0 10 0	3 30 0	9 6 0	5 10 0	3 12 0	111 14 0
47	Jaladhar Mondal	Nalban ...	0 8 0	1 10 0	9 2 8	22 10 6	19 8 0	3 2 6	23 14 9
48	Haladhar Mistry	Do. ...	0 15 0	2 0 0	14 13 0	35 13 0	32 0 0	3 13 0	16 4 0
49	Ram Prosad Mistry	Nishanbari...	1 0 0	3 20 0	25 3 4	62 11 3	51 15 0	10 12 3	32 4 9
50	Purna Chandra Gope ...	Guita-Krishnanagar.	2 5 0	8 5 0	55 2 8	137 10 6	108 4 0	29 6 6	35 3 4
51	Joy Chand Bepari	Ghatarchar	0 15 0	2 0 0	16 4 4	40 4 3	33 12 0	6 8 3	26 1 0
52	Asananda Mandal	Basbari ...	0 2 0	0 5 0	2 0 8	5 0 6	4 4 0	0 12 6	23 7 0
53	Umanath Mandal	Nandakhali	0 16 0	2 10 0	20 0 0	50 0 0	36 8 0	13 8 0	37 10 0
54	Kokaram Mondal	Tetuljhora ...	1 4 0	4 10 0	35 0 0	87 8 0	61 10 0	25 14 0	64 11 0
55	Sabed Khan	Ditto ...	0 16 0	2 10 0	38 0 0	95 0 0	50 7 0	44 9 0	167 1 9
56	Haladhar Mondal	Ditto ...	0 16 0	2 10 0	25 0 0	62 8 0	48 8 0	14 0 0	52 8 0
57	Krishna Kumar Mandal ...	Sudharchar	0 7 0	1 0 0	12 20 0	31 0 0	22 8 0	8 12 0	75 0 0
58	Hamai Dewan	Parbagaon. (Khas mahal.)	0 12 0	1 20 0	5 10 0	13 2 0	21 6 0	.....	.....
59	Badshahi Haldar	Ditto (Khas mahal.)	0 7 0	1 0 0	7 3 0	17 11 0	16 0 0	1 11 0	14 7 10
60	Ilim Dewan	Ditto (Khas mahal.)	0 8 0	1 10 0	6 10 0	15 10 0	18 2 0	.....	.....
61	Jamai Dewan	Ditto (Khas mahal.)	0 3 0	0 20 0	2 5 0	12 13 0	9 8 0	3 5 0	66 4 0
62	Badan Haldar	Ditto (Khas mahal.)	0 5 0	0 20 0	5 10 0	13 2 0	10 6 0	2 12 0	55 0 0
63	Amri Haldar	Ditto (Khas mahal.)	0 1 0	0 5 0	1 10 0	3 2 0	4 12 0	.....	.....
64	Bagai Haldar	Ditto (Khas mahal.)	0 1 0	0 5 0	1 20 0	3 12 0	5 0 0	.....	.....
65	Michhil Moral Hazi ...	Baghra ...	0 6 0	1 10 0	5 3 0	12 11 0	15 8 0	.....	.....
66	Panchu Mal	Do. ...	0 6 0	1 10 0	8 15 0	20 15 0	16 11 0	4 4 0	62 8 0
67	Sadaraddi Gachhi	Do. ...	0 6 0	1 10 0	6 18 0	16 2 0	15 8 0	0 10 0	6 4 0
68	Abdul Gani Talukdar ...	Do. ...	0 2 0	0 20 0	4 3 0	10 3 0	9 2 0	1 1 0	31 14 0
69	Madan Talukdar	Do. ...	0 6 0	1 10 0	7 35 0	19 11 0	18 8 0	1 3 0	11 14 0
70	Sheikh Reajuddin	Do. ...	0 6 0	1 10 0	7 35 0	19 11 0	17 11 0	2 0 0	20 0 0
71	Jaharaddi Chowkidar ...	Do. ...	0 6 0	1 10 0	8 3 0	20 3 0	18 6 0	1 13 0	18 2 0
72	Sonatan Mandal	Angaira ...	0 14 8	2 10 0	25 38 0	64 14 0	45 6 0	19 8 0	80 12 6
73	Manda Mandal	Do. ...	0 8 0	1 5 0	11 10 0	28 2 0	22 8 0	5 10 0	42 3 0
74	Lalbehari Kaviraj	Chakighata	0 8 0	0 30 0	5 0 0	12 8 0	11 12 0	0 12 0	5 10 0
75	Sheikh Abdul Gafur ...	Hatkora ...	0 5 0	0 30 0	5 7 0	12 15 0	12 8 0	0 7 0	5 4 0
76	Sheikh Nidhan	Bistapur ...	0 12 0	2 0 0	12 10 0	30 10 0	27 9 0	3 1 0	15 5 0
77	,, Kalam Pradhan ...	Chas Mastul	0 12 0	2 0 0	11 7 0	28 9 0	27 6 0	1 3 0	5 15 0
78	Abdul Gafur	Bistapur ...	0 18 8	3 14 0	22 0 0	55 0 0	48 8 0	6 8 0	21 7 8
79	Sheikh Nasimuddi	Bandoita ...	0 5 0	0 30 0	5 5 0	12 13 0	12 12 0	0 1 0	0 12 0
80	,, Akbar Bepari ...	Char Matia	0 2 8	0 15 0	4 3 0	10 3 6	8 12 0	1 7 0	25 8 0
81	,, Kamu Bepari ...	Char Hijuli	0 12 0	2 0 0	11 15 0	30 15 0	26 6 0	4 9 0	22 13 0
82	,, Ilim Prodhan ...	Betila ...	0 2 8	0 15 0	3 15 0	7 15 0	8 6 0	.....	.....
83	,, Nabu	Char Ajanpur	0 12 0	2 0 0	17 0 0	42 13 0	34 7 0	8 6 0	41 14 0
84	,, Janik	Abudanga	0 5 0	0 30 0	6 0 0	15 0 0	13 2 0	1 14 0	22 0 0
85	,, Jonabali	Chakmirpur	0 5 0	1 0 0	6 0 0	15 0 0	14 8 0	0 8 0	6 0 8

N. B.—The khasmahal officers at first made no arrangements with the cultivators and as such could not distribute the potatoes till very late in the season. The seeds were planted in rather unprepared soil, which is responsible for the bad result.

RESULTS OF POTATO CULTIVATION, 1914.

Mymensingh.

No.	Names of cultivators.	Village.	Area of land.	Quantity of seeds.	DATE.		Outturn.	Price of outturn.	Cost of cultivation and price of seeds.	PROFIT.	
					Sowing.	Harvesting.				Per plot.	Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K. CH.	M. S. CH.			M. S. CH.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	Ranjan Sarkar	Bhatara ...	0 5 0	1 0 0	25-10-14	24-2-15	10 25 0	26 9 0	15 0 0	11 9 0	138 13 0
2	Rafikuddin Ahamed	Dharmakura	2 10 0	5 0 0	28-10-14	23-2-15	125 0 0	312 8 0	75 0 0	237 8 0	285 0 0
3	Indu Sarkar	Pakhimari ...	0 18 0	2 30 0	26-10-14	4-3-15	25 0 0	62 8 0	41 4 0	21 4 0	70 13 4
4	Dinesh Chandra Chakravarty	Beltia	0 4 0	0 20 0	27-10-14	10-3-15	10 0 0	25 0 0	7 8 0	17 8 0	262 8 0
5	Nurmamud Sirkar	Pakhimari ...	0 5 0	0 30 0	28-10-14	26-2-15	10 20 0	26 4 0	11 4 0	15 0 0	180 0 0
6	Hasan Mir	Krishnapur ...	1 5 0	4 0 0	23-10-14	24-2-15	36 20 0	91 4 0	60 0 0	31 4 0	75 0 0
7	Hara Prasanna Gangopadhyay	Jamalpur ...	0 10 0	1 32 0	26-10-14	23 2-15	15 0 0	37 8 0	27 0 0	10 8 0	63 0 0
8	Pitambar Das	Beltia	1 0 0	3 0 0	27-10-14	4-3-15	45 0 0	112 8 0	45 0 0	67 8 0	202 8 0
9	Madari Akanda	Pakhimari ...	0 10 0	1 20 0	23-10-14	26-2-15	13 26 0	34 2 0	22 8 0	11 10 0	69 12 0
10	Sarifulla Mandal	Ditto ...	0 13 0	2 20 0	24-10-14	27-2-15	30 20 0	76 4 0	37 8 0	38 12 0	178 13 6
11	Baharuddin Sirkar	Sreerampur ...	0 10 0	1 20 0	28-10-14	28-2-15	20 20 0	51 4 0	22 8 0	28 12 0	172 8 0
12	Kalemuddin Sirkar	Ditto ...	0 12 0	2 0 0	25-10-14	20-2-15	18 8 0	45 8 0	30 0 0	15 8 0	77 8 0
13	Kudratulla Mandal	Gorakanda ...	0 4 0	0 20 0	26-10-14	25-2-15	7 30 0	19 6 0	7 8 0	11 14 0	178 2 0
14	Nayan Sirkar	Berapathalia	0 8 0	1 0 0	26-10-14	2-3-15	22 10 0	55 10 0	15 0 0	40 10 0	304 11 0
15	Laskar Mandal	Ditto ...	0 5 0	1 0 0	26-10-14	25-2-15	12 30 0	31 41 0	15 0 0	16 14 0	202 8 0
16	Sher Mamud Sirkar	Ditto ...	0 4 0	0 20 0	24-10-14	28-2-15	10 0 0	25 0 0	7 8 0	17 8 0	262 8 0
17	Nazir Mamud Sarkar	Ditto ...	0 5 0	0 30 0	24-10-14	24-2-15	14 0 0	35 0 0	11 4 0	23 12 0	285 0 0

APPENDIX VII—*contd.*

Mymensingh—contd.

No.	Names of cultivators.	Village.	Area of land.	Quantity of seeds.	DATE. Sowing.	DATE. Harvesting.	Outturn.	Price of outturn.	Cost of cultivation and price of seeds.	PROFIT. Per plot.	PROFIT. Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K. CH.	M. S. CH.			M. S. CH.	Rs. A. P.	Rs. A. P.	Rs. A. P	Rs. A. P.
18	Mahar Shaikh	Bhengura ...	0 2 0	0 10 0	26-10-14	25-2-15	11 0 0	27 8 0	3 12 0	23 12 0	712 8 0
19	Joymal Prodhan	Ditto ...	0 15 0	2 10 0	27-10-14	23-2-15	23 35 0	59 11 0	33 11 0	25 15 0	103 12 0
20	Bashir Shaikh	Ditto ...	0 14 0	2 0 0	28-10-14	24-2-15	25 16 0	63 8 0	30 0 0	33 8 0	143 9 6
21	Genda Shaikh	Ditto ...	0 2 0	0 10 0	27-10-14	3-3-15	4 20 0	11 4 0	3 12 0	7 8 0	225 0 0
22	Ashmat Shaikh	Ditto ...	0 4 0	0 20 0	28-10-14	26-2-15	9 35 0	24 11 0	7 8 0	17 3 0	257 13 0
23	Inuddin Shaikh	Ditto ...	0 4 0	0 20 0	27-10-14	23-2-15	8 10 0	20 10 0	7 8 0	13 2 0	196 14 0
24	Gafar Shaikh	Ditto ...	0 4 0	0 20 0	28-10-14	2 3-15	15 0 0	37 8 0	7 8 0	30 0 0	450 0 0
25	Bocha Mudi	Ditto ...	0 4 0	0 20 0	26-10-14	3-0-15	7 25 0	19 1 0	7 8 0	11 9 0	173 7 0
26	Saichari	Ditto ...	0 4 0	0 20 0	1-11-14	2-3-15	7 35 0	19 11 0	7 8 0	12 3 0	182 13 0
27	Shyama Charan Mauzumdar ...	Gangapara ...	0 3 0	0 12 8	28-10-14	3-3-15	4 15 0	10 15 0	4 11 0	6 4 0	125 0 0
28	Davendra Chandra Mazumdar	Ditto ...	0 3 0	0 30 0	2- 2-14	28-2-15	12 5 0	30 5 0	11 4 0	19 1 0	381 4 0
29	Hem Chandra Bakshi	Ditto ...	0 4 0	0 20 0	4-11-14	2[illegible]-15	6 10 0	15 4 0	7 8 0	7 12 0	116 4 0
30	Mofezulla Khan	Dengargor ...	0 1 0	0 5 0	3-11-14	1-3-15	3 0 0	7 8 0	1 14 0	5 10 0	337 8 0
31	Nekjan Khalashi	Ditto ...	0 2 0	0 10 0	1-11-14	3-3-15	5 15 0	13 7 0	3 12 0	9 11 0	290 10 0
32	Sreenath Modak	Polabhanda ...	0 4 0	0 20 0	2-11-14	5-3-15	7 20 0	18 12 0	7 8 0	11 4 0	168 12 0
33	Nuria Kaibarta	Ditto ...	0 3 0	0 15 0	3-11-14	4-3-15	7 0 0	17 8 0	5 10 0	11 14 0	237 8 0
34	Eratulla Shaikh	Ditto ...	0 1 0	0 5 0	5-11-14	25-2-15	2 30 0	6 14 9	1 14 0	5 0 0	300 0 0
35	Safarulla Mondal	Ditto ...	0 2 0	0 7 0	2-11-14	23-4-15	2 22 0	8 14 0	2 13 0	6 1 0	181 14 0
36	Superintendent of Raja Bahadur's garden.	Mymensingh	1 0 0	3 0 8	25 10-14	20-2-15	30 23 0	76 4 0	45 0 0	31 4 0	93 12 0
37	Jabbar Shekh	Golgonda ...	0 5 0	1 0 0	26-10-14	25-2-15	30 10 0	75 10 0	15 0 0	60 10 0	727 8 0
38	Shaikh Basar Munshi	Maizbari ...	0 2 0	0 10 0	26-10-14	2-3-15	5 30 0	14 6 0	3 12 0	10 10 0	318 12 0
39	,, Samiruddin Munshi ...	Ditto ...	0 5 0	0 30 0	28-10-14	4-3-15	14 0 0	35 0 0	11 4 0	23 12 0	285 0 0
40	Girish Chandra Dey	Khagdhar ...	0 3 0	0 20 0	26-10-14	2-3-15	6 0 0	15 0 0	7 8 0	7 8 0	150 0 0
41	Shaikh Sarip	Ditto ...	0 4 0	0 20 0	27-11-14	25-2-15	6 0 0	15 0 0	7 8 0	7 8 0	112 8 0
42	Rahamatulla Munshi	Mrizapur ...	0 4 0	0 20 0	26-10-14	1-3-15	2 20 0	11 4 0	7 8 0	3 12 0	56 4 0
43	Izjat Mondal	Maizbari ...	0 2 0	0 8 0	26-10-14	28-2-15	3 2 0	7 10 0	3 0 0	4 10 0	138 12 0
44	Kendu Mondal	Ditto ...	0 2 0	0 10 0	28-10-14	28-2-15	4 20 0	11 4 0	3 12 0	7 8 0	225 0 0
45	Mamudjan Mondal	Mrizapur ...	0 4 0	0 20 0	2-11-14	21-2-15	6 33 0	17 7 0	7 8 0	9 15 0	149 1 0
46	Shekur Mamud Sirkar ...	Banadurpur ...	0 2 0	0 10 0	1-11-14	26-2-15	3 0 0	7 8 0	3 12 0	3 12 0	112 8 0
47	Basanta K. Banarjee	Maminpur ...	3 0 0	10 0 0	25-10-14	23-2-15	320 10 0	800 10 0	150 0 0	650 10 0	650 10 0
48	Izjat Shaikh	Nidhar char	0 5 0	0 30 0	25-10-14	23-2-15	12 0 0	30 0 0	11 4 0	18 12 0	225 0 0
49	Abdul Mollah	Ditto ...	5 15 0	2 20 0	25-10-14	28-2-15	20 0 0	50 0 0	37 8 0	12 8 0	50 0 0
50	Samiruddin Shaikh	Ditto ...	0 3 0	0 10 0	31-10-14	25-2-15	4 0 0	10 0 0	3 12 0	6 4 0	125 0 0
51	Ali Akanda	Ditto ...	0 6 0	0 32 0	24-10-14	23-2-15	19 0 0	47 8 0	12 0 0	35 8 0	355 0 0
52	Jabir Shaikh	Ditto ...	0 4 0	0 20 0	22-10-14	25-2-15	10 10 0	25 10 0	7 8 0	18 2 0	271 14 0
53	Ashmat Ali Shaikh	Ditto ...	0 4 0	0 10 0	27-10-14	21-2-15	3 35 0	9 11 0	3 12 0	5 15 0	89 1 0
54	Hosen Ali Shaikh	Ditto ...	0 2 0	0 10 0	25-10-14	3-3-15	4 25 0	11 9 0	3 12 0	7 13 0	234 6 0
55	Shaikh Alim Bipari	Ditto ...	0 5 0	0 25 0	28-10-14	1-3-15	12 0 0	30 0 0	9 6 0	20 10 0	247 8 0
56	Aziz Sarkar	Ditto ...	0 4 0	0 20 0	25-10-14	28-2-15	10 0 0	25 0 0	7 8 0	17 8 0	262 8 0
57	Fazu Sarkar	Ditto ...	0 2 0	0 10 0	1-11-14	3-3-15	4 0 0	10 0 0	3 12 0	6 4 0	187 8 0
58	Mamudali Shaikh	Ditto ...	0 2 0	0 10 0	2[illegible]-11-14	3 3-15	3 20 0	8 12 0	3 12 0	5 0 0	150 0 0
59	Shaikh Khoda Box	Ditto ...	0 2 0	0 10 0	1-11-14	2-3-15	8 10 0	20 10 0	3 12 9	16 14 0	506 4 0
60	Pran Kumar Kundu.	Tarati ...	0 4 0	0 20 0	3-11-14	4-3-15	5 30 0	14 6 0	7 8 0	6 14 0	103 2 0
61	Roshen Ali Shaikh	Do. ...	0 2 0	0 10 0	27-10-14	28-2-15	3 0 0	7 8 0	3 12 0	3 12 0	112 8 0
62	Golap Ali Shaikh	Do. ...	0 2 0	0 10 0	28-10-14	26-2-15	3 0 0	7 8 0	3 12 0	3 12 0	112 8 0
63	Amiruddin Shaikh	Kaladia ...	0 2 0	0 10 0	25-10-14	27-2-15	3 5 0	7 13 0	3 12 0	4 1 0	121 14 0
64	Dengu Shaikh	Tarati ...	0 1 0	0 5 0	26-10-14	23-2-15	2 0 0	5 0 0	1 14 0	3 2 0	187 8 0
65	Kasem Shaikh	Do. ...	0 1 0	0 5 9	27-10-14	27-2-15	2 20 0	6 4 0	1 14 0	4 6 0	262 8 0
66	Samiruddin Khan	Kalmohana ...	0 1 0	0 5 0	1-11-14	28-2-15	2 20 0	6 4 0	1 14 0	4 6 0	262 8 0
67	Amiruddin Khan	Ditto ...	0 1 0	0 2 0	25-10-14	26-2-15	2 0 0	5 0 0	0 12 0	4 4 0	255 0 0
68	Onikonali Shaikh	Ditto ...	0 1 0	0 5 0	28-10-14	2-3-15	1 20 0	3 12 0	1 14 0	1 14 0	182 8 0
69	Srish Ch. Shome	Kishoreganj ...	0 5 0	0 30 0	26-10-14	21-2-15	12 10 0	30 10 0	11 4 0	19 6 0	232 8. 0
70	Kailash Ch. Chakravarty ...	Kamalpur ...	1 0 0	3 20 0	26-10-14	24-2-15	22 0 0	55 0 0	52 8 0	2 8 0	7 8 0
71	Bepin Ch. Biswas	Jashodal ...	0 5 0	1 0 0	28-10-14	23-2-15	31 10 0	78 2 0	15 0 0	63 2 0	757 8 0
72	Kumud B. Roy	Kishoreganj ...	0 4 0	0 20 0	26-10-14	24-2-15	6 0 0	15 5 0	7 8 0	7 .8 0	112 8 0
73	Bepin Ch. Roy	Jashodal ...	0 4 0	0 20 0	26.10.14	25-2-15	6 5 0	15 5 0	7 8 0	7 13 0	117 3 0
74	Kailash Ch. Roy	Kamalpur ...	9 0 0	30 0 0	26-10-14	23-2-15	750 0 0	1,875 0 0	450 0 0	1,425 0 0	475 0 0
75	Joynuiuddin	Bharibpur ...	3 0 0	10 0 0	28-10-14	23-3-15	370 38 0	927 6 0	150 0 0	777 6 0	777 6 0
76	Lalmamud	Kamalpur ...	3 0 0	10 0 0	27-10-14	24-2-15	250 0 0	625 0 0	150 0 0	475 0 0	475 0 0
77	Rahamatulla Shaikh	Shambhupur	0 5 0	0 15 0	22-10-14	26-2-15	16 0 0	40 0 0	20 10 0	19 6 0	232 8 0
78	Mamud Ali Shaikh	Gochamara ...	1 0 0	3 0 0	25-10-14	23-2-15	58 0 0	145 0 0	45 0 0	100 0 0	300 0 0
79	Ibrahim Shaikh	Kamalpur ...	0 15 0	2 0 0	24 10-14	26-2-15	25 0 0	62 8 0	30 0 0	32 8 0	130 0 0
80	Hosenali Shaikh	Bhairabpur ...	2 2 0	6 0 0	3-11-14	9-3-15	110 0 0	275 0 0	90 0 0	185 0 0	264 4 7
81	Sobedar Bepari	Ditto ...	1 0 0	4 0 0	3-11-14	23-2-15	121 0 0	302 8 0	60 0 0	242 8 0	727 8 0
82	Bhairab Bepari	Ditto ...	1 0 0	3 0 0	5-11-14	8-3-15	80 0 0	200 0 0	45 0 0	156 0 0	465 0 0
83	Kalon Bepari	Ditto ...	1 16 0	4 0 0	8-11-14	10 2-15	90 0 0	225 0 0	60 0 0	165 0 0	275 0 0
84	Hafezuddin Munshi	Kamalpur ...	1 9 0	5 0 0	30-11-14	15-2-15	60 0 0	150 0 0	75 0 0	75 0 0	155 2 9
85	Taru Bepari	Bhairabpur ...	0 5 0	2 32 0	4-11-14	2-3-15	12 0 0	00 0 0	8 10 0	21 6 0	256 8 0
86	Shahar Ali Bepari	Kamalpur ...	1 11 0	5 0 0	4-11-14	25-2-15	50 0 0	125 0 0	75 0 0	50 0 0	96 12 5
87	Abdul Shaikh	Ditto ...	0 19 0	1 0 0	1-11-14	23-2,15	22 0 0	62 8 0	15 0 0	47 8 0	285 0 0
88	Prakash Ch. Roy	Ditto ...	0 6 0	0 20 0	3-11-14	1-3-15	6 0 0	15 0 0	7 8 0	7 8 0	75 0 0
89	Abid Shaikh	Bhairabpur ...	0 7 0	1 0 0	2-11-14	7-3-15	19 0 0	47 8 0	15 0 0	32 8 0	278 9 1
90	Sekandar Shaikh	Ditto ...	1 0 0	3 0 0	2-11-14	7-3-15	50 0 0	125 0 0	45 0 0	80 0 0	240 0 0
91	Kishori Lal Sen Gupta ...	Kishoreganj ...	0 4 0	0 20 0	13-11-14	5-3-15	10 0 0	25 0 0	7 8 0	17 8 0	262 8 0
92	Faziuddin Ahamed	Sarishabari ...	0 16 0	2 20 0	26-10-14	23-2-15	25 0 0	62 8 0	37 8 0	25 0 0	93 12 0
93	Zenatali Ahmed	Akashi ...	0 10 0	1 2 0	10-11-14	19-2-15	18 30 0	46 14 0	15 12 0	31 2 0	116 12 0
94	Naimuddin Ahamed	Do. ...	9 2 0	0 12 0	11-11-14	21-2-15	3 35 0	9 11 0	4 8 0	5 3 0	155 10 0
95	Piyarulla Mondal	Baira ...	0 2 0	0 15 0	5-11-14	11-2-15	3 30 0	9 6 0	5 10 0	3 12 0	142 8 0
96	Pagu Khan	Do. ...	0 2 0	0 10 0	8-11-14	12-2-15	3 20 0	8 12 0	3 12 0	5 0 0	150 0 0
97	Rakobali Sarkar	Chachiabanda	0 1 0	0 10 0	7-11-14	26-2-15	2 36 0	7 4 0	3 12 0	3 8 0	210 0 0
98	Aftabuddin Munshi	Baira ...	0 2 0	0 10 0	5-11-14	24-2-15	5 0 0	12 8 0	3 12 0	8 12 0	262 8 0
99	Md. Easin Sarkar	Akashi ...	1 0 0	0 31 8	10-11-14	10-2-15	35 22 0	88 14 0	11 13 0	77 1 0	231 3 0
100	Abdulali Shaikh	Do. ...	0 1 0	0 5 4	7-11-14	23-2-15	2 3 0	5 3 0	1 15 6	3 3 6	193 2 0
101	Kutab Mandal	Kurulia ...	0 1 0	0 5 0	8-11-14	27-2-15	2 0 0	5 0 0	1 15 6	3 0 6	181 14 0
102	Nachar Mondal	Baira ...	0 1 0	0 3 0	10-11-14	23-2-15	1 25 0	4 1 1	1 2 0	2 15 0	176 7 0
103	Jinatali Mondal	Do. ...	0 1 0	0 6 0	11-11-14	19-2-15	1 20 0	3 12 0	2 4 0	1 8 0	90 0 0
104	Fazu Mondal	Do. ...	0 2 0	0 10 0	9-11,14	17-2-15	5 0 0	12 8 0	3 12 0	7 12 0	262 8 0
105	Saboo Akanda	Do ...	0 3 0	0 21 0	15-11-14	18-2-15	6 0 0	15 0 0	7 14 0	8 2 0	142 8 0
106	Ananda Kishore Chakravarty	Maizbari ...	0 1 0	0 7 8	20-11-14	22-2-15	2 0 0	5 0 0	2 13 0	2 3 0	131 4 0
107	Ram Sundar Sutradhar ...	Binnafair ...	0 3 0	0 15 0	25-11-14	21-2-15	9 0 0	22 8 0	5 10 0	16 14 0	337 8 0
108	Farezulla Shekh	Chachiabanda	0 3 0	0 15 0	27-11-14	23-2-15	6 0 0	15 0 0	5 10 0	9 6 0	187 8 0
109	Johir Mandal	Baira ...	0 1 0	0 5 0	21-11-14	24-2-15	1 22 0	3 14 0	1 14 0	2 0 0	120 0 0
110	Hosen Munshi	Porabari ...	0 4 0	0 25 0	25-11-14	25-2-15	10 0 0	25 0 0	9 6 0	15 10 0	234 6 0
111	Kana Sarkar	Baira ...	0 1 0	0 4 0	23-11-14	23-2- 5	2 0 0	5 0 0	1 8 0	3 8 0	210 0 0
112	Prakash Chandra Roy	Netrakona ...	0 2 0	0 10 0	26-11-14	23-2-15	7 20 0	18 12 0	3 12 0	15 0 0	450 0 0
113	Akhoy Kumar Sen	Kumree ...	0 3 0	0 20 0	23-10-14	23-2- 5	18 0 0	45 6 0	7 8 0	37 8 0	750 0 0
114	Hamid Uddin Khan	Katlee ...	0 17 0	2 25 0	26-10-14	24-2-15	57 30 0	144 6 0	39 6 0	105 0 0	370 9 5
115	Hafiz Uddin Khan	Do. ...	0 4 0	0 20 0	27- 0-14	25-2-15	12 0 0	30 0 0	7 8 0	22 8 0	337 8 0
116	Mahim Chandra Sen	Kailaty ...	0 4 0	0 20 0	28-10-14	23-2-15	14 10 0	35 10 0	7 8 0	28 2 0	241 14 0
117	Judhisthir Nath Chowdhuri ...	Hossenpur ...	0 3 0	0 15 0	26-.0-14	24-2-15	8 0 0	20 0 0	5 19 0	14 6 0	287 8 0
118	Mahi Uddin Ahmed	Medini ...	0 4 0	0 20 0	27-10-14	23-2-15	12 20 0	31 4 0	7 8 0	23 12 0	356 4 0

APPENDIX VII—*contd.*

Mymensingh—concld.

No.	Names of cultivators.	Village.	Area of land.	Quantity of seeds.	DATE.		Outturn.	Price of outturn.	Cost of cultivation and price of seed.	PROFIT.	
					Sowing.	Harvesting.				Per plot.	Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K. CH.	M. S. CH.			M. S. CH.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
119	Mafizuddin Ahamed	Mailakanda ...	0 16 0	2 0 0	28-10-14	24-2-15	40 0 0	100 0 0	30 0 0	70 0 0	262 8 0
120	Muhammad Nurel Hossen ...	Dhala ...	0 7 0	1 0 0	27-10-14	24-2-15	24 0 0	60 0 0	15 0 0	45 0 0	385 12 0
121	Dhirendra Chandra Roy ...	Shibnagar ...	0 15 0	2 0 0	28-10-14	23-2-15	40 0 0	100 0 0	30 0 0	70 0 0	280 0 0
122	Sonatan Shaha Talugdar ...	Malini ...	0 2 0	0 10 0	29-10-14	26-2-15	6 0 0	15 0 0	3 12 0	11 4 0	337 8 0
123	Chairman of Municipality ...	Netrakona ...	0 3 0	0 20 0	22-10-14	28-2-15	6 0 0	15 0 0	7 8 0	7 8 0	150 0 0
124	Jadu Nath Chakravorty ...	Ditto ...	0 1 0	0 5 0	23-10-14	26-2-15	1 20 0	3 12 0	1 14 0	1 14 0	112 8 0
125	Sashi Kamal Chakravorty ...	Ditto ...	0 1 0	0 5 0	24-10-14	27-2-15	1 22 0	3 14 0	1 14 0	2 0 0	120 0 0
126	Probhat Chandra Chakravorty	Ditto ...	0 1 0	0 3 0	25-10-14	22-2-15	1 20 0	3 12 0	1 2 0	2 10 0	157 8 0
127	J. M. Chowdhury, Deputy Collector.	Ditto ...	0 1 0	0 5 0	23-10-14	28-2-15	1 21 0	3 13 0	1 14 0	1 15 0	116 4 0
128	Guroo Training school	Ditto ...	0 1 0	0 5 0	23-10-14	24-2-15	1 22 0	3 14 0	1 14 0	2 0 0	120 0 0
129	Ishan Chandra Chowdhury ...	Ditto ...	0 1 0	0 4 0	24-10-14	23-2-15	1 20 0	3 12 0	1 8 0	2 4 0	135 0 0
130	Durga Charan Dutta	Ditto ...	0 1 0	0 7 8	27-10-14	27-2-15	1 25 0	4 1 0	2 13 0	1 4 0	75 0 0
131	Munshi Joeherali	Nagra ...	0 1 0	0 7 8	25-10-14	26-2-15	2 5 0	5 5 0	2 13 0	2 8 0	150 0 0
132	Kristoo Charan Chowdhury ...	Netrakona ...	0 1 0	0 3 0	25-10-14	24-2-15	1 20 0	3 12 0	1 2 0	2 10 0	157 8 0
133	Sudhir Chandra Ghose	Ditto ...	0 4 0	0 5 0	26-10-14	23-2 15	1 24 0	4 0 0	1 14 0	2 2 0	127 8 0
134	Iswor Chandra Sarkar	Manaharpur	0 1 0	0 3 0	26-10-14	23-2-15	1 23 0	3 15 0	1 2 0	2 13 0	168 12 0

Faridpur.

Serial No.	Names of cultivators.	Village.	Area of plot.	Quantity of seeds.	DATE.		Outturn.	Price of outturn.	Cost of cultivation and price of seeds.	PROFIT.	
					Sowing.	Harvesting.				Per plot.	Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K. CH.	MD. S. CH.			MD. S. CH.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	Rahimaddi Bepari	Charjamajat	0 5 0	1 0 0	20-11-14	28-2-15	8 32 0	26 6 6	15 4 0	9 2 6	109 14 0
2	Helaluddin Munshi	Rajapur ...	0 10 0	2 0 0	15-11-14	23-2-15	18 36 0	56 11 3	30 8 0	26 6 3	314 7 0
3	Sheikh Komaraddi	Baburchar ...	0 5 0	1 0 0	16-11-14	3-3-15	6 35 0	20 10 0	15 4 0	5 6 0	64 8 0
4	,, Amir Molla	Ditto ...	0 5 0	1 0 0	16-11-14	26-2-15	4 2 0	12 2 6	15 4 0	.....	.....
5	,, Sabedali	Ditto ...	0 5 0	1 0 0	14-11-14	24-2-15	7 33 0	22 11 9	15 4 0	7 7 9	89 13 0
6	,, Mararaddi	Ditto ...	0 5 0	1 0 0	16-11-14	25-2-15	6 18 0	19 5 6	15 4 0	4 1 6	49 2 0
7	,, Azgar	Ditto ...	0 5 0	1 0 0	15-11-14	24-2-15	8 14 0	25 0 9	15 4 0	9 12 9	117 9 0
8	Ujir Mamud	Ditto ...	0 5 0	1 0 0	15-11-14	22-2-15	3 35 0	11 10 0	15 4 0	.....	.....
9	Hadulla Hazi	Ditto ...	0 5 0	1 0 0	15-11-14	26-2-15	8 6 0	24 7 3	15 4 0	9 3 3	109 7 0
10	Adu Hazi	Ditto ...	0 5 0	1 0 0	15-11-14	27-2-15	5 26 0	16 15 3	15 4 0	1 11 3	20 7 0
11	Muhammad Matubbar	Ditto ...	0 5 0	1 6 0	14-11-14	2-3-15	11 7 0	33 8 6	15 4 0	18 4 6	219 6 0
12	Ketabdi Matubbar	Madhumollar-gram.	2 14 10	9 10 0	20-11-14	25-2-15	65 12 0	197 4 0	149 7 0	47 13 0	114 4 9
13	Babu Rashik Lal Basu ...	Sadarpur ...	0 1 4	0 10 0	18-11-14	2-3-15	1 35 0	5 10 0	3 13 0	1 13 0	87 0 0
14	,, Heramba Kumar Ghosh	Ditto ...	0 1 4	0 10 0	18-11-14	2-3-15	2 0 0	6 0 0	3 13 0	2 3 0	105 0 0
15	,, Radhika Mohan Lahiri	Koraidi ...	0 10 0	2 0 0	25-11-14	15-3-15	23 6 0	69 7 0	30 8 0	38 15 0	233 10 0
16	Gay Jaddi Bepari	Khatra ...	0 7 0	1 25 0	10-11-14	8-3-15	12 20 0	31 4 0	22 10 9	8 9 3	73 0 0
17	Sheikh Naser	Ditto ...	0 10 0	2 0 0	15-11-14	8-3-15	15 0 0	37 8 0	27 12 0	9 12 0	58 8 0
18	Munshi Umedali	Ditto ...	0 10 0	2 0 0	11-11-14	8-3-15	13 32 0	34 8 0	24 12 0	9 12 0	58 8 0
19	Manik Munshi	Kha-minar-Bag.	0 15 0	3 0 0	11-11-14	8-3-15	31 8 0	77 8 0	42 10 0	34 14 0	139 8 0
20	Yar Maun	Gadadhurdi ...	0 7 0	1 20 0	11-11-14	8-3-15	16 0 0	40 0 0	26 5 0	13 11 0	116 10 0
21	Kamuddi Khan	Khaminur Bag.	0 5 0	1 0 0	19-10-14	11-3-15	10 27 0	27 7 0	14 14 0	12 9 0	150 12 0
22	Sheikh Offajaddi	Gadadhardi ...	0 10 0	2 0 0	17-11-14	11-3-15	13 6 0	32 10 0	26 12 6	5 14 0	35 4 0
23	,, Aijaddi	Ghaura ...	0 10 0	2 0 0	17-11-14	11-3-15	9 16 0	23 8 0	23 12 0	.....	.....
24	Rayajaddi Biswas	Ditto ...	0 5 0	1 0 0	17-11-14	11-3-15	8 28 0	21 11 0	15 14 0	5 9 0	66 12 0
25	Shaikh Babur Ali	Gadadhardi ...	0 10 0	2 0 0	5-11-14	12-3-15	17 21 0	42 8 0	26 12 0	15 14 0	95 4 0
26	,, Gayjaddi	Ghaura ...	0 8 0	1 32 0	6-11-14	12-3-15	16 14 0	40 14 0	29 9 0	16 5 0	121 9 0
27	Karaman Khalifa	Do. ...	0 5 0	1 0 0	6-11-14	12-3-15	16 7 0	40 7 0	16 14 0	23 9 0	282 12 0
28	Aijaddi Sikder	Do. ...	1 10 0	6 0 0	25-11-14	7-3-15	56 33 0	142 1 0	80 4 0	61 13 0	123 10 0
29	Shaikh Rayajaddi	Chauki Ghata	0 3 0	0 20 0	20-11-14	7-3-15	4 3 0	10 3 0	8 6 0	1 12 0	35 0 0
30	Abdur Rahaman Khan ...	Khaminar Bag	0 7 0	1 20 0	18-11-14	11-3-15	14 18 0	36 2 0	10 3 0	15 3 0	121 8 0
31	Jay Chandra Patni	Ghaura ...	0 5 0	0 35 0	9-2 14	13-3-15	9 22 0	24 5 3	14 7 0	9 15 0	119 4 0
32	Gopal Khan	Khaminar Bag	0 2 8	0 20 0	9-1-14	12-3-15	3 13 0	8 3 0	7 7 0	0 14 0	21 0 0
33	Sadan Mollah	Narani Kandi	1 0 0	4 0 0	18-11-14	12-3-15	45 18 0	113 10 0	83 8 0	5 2 0	15 6 0
34	Azahar-uddin Laskar	Daharpur ...	0 1 6	0 10 0	18-11-14	12-3-15	2 38 0	7 6 0	4 11 6	2 10 6	159 6 0
35	Dinesh Chandra Rahut ...	Ghaura ...	0 10 0	2 0 0	12-11-14	10-3-15	19 18 0	48 10 0	28 12 0	19 14 0	119 4 0
36	Shaikh Elem	Gadadhurdi ...	0 2 0	0 20 0	14-11-14	11-3-15	4 31 0	10 15 0	8 7 0	2 8 0	75 0 0
37	Banamali Chandra	Ghaura ...	0 2 9	0 20 0	14-11-14	11-3-15	3 8 0	7 15 0	7 7 0	0 8 0	15 0 0
38	Maulvi Abdul Gafur	Nurpur ...	0 5 4	1 0 0	48-11-14	13-3-15	10 3 0	25 3 0	15 14 0	9 5 0	111 12 0
39	Shaikh Kazem	Daharpur ...	0 5 0	1 0 0	15-11-14	7-3-15	9 25 0	24 11 0	15 14 0	8 13 0	105 12 0
40	Ainaddi Shaikh	Do. ...	0 5 0	1 0 0	15-11-14	7-3-15	17 35 0	43 15 0	18 14 0	25 3 0	302 4 0
41	Adiladdi Shaikh	Sharipabad ...	0 10 0	2 0 0	22-11-14	10-3-15	8 31 4	21 15 0	25 12 0	.....	.....
42	Taraprasanna Roy	Daparpur ...	0 1 0	0 10 0	25-11-14	12-3-15	0 30 0	1 14 0	1 13 0	0 1 0	3 12 0
43	Asan Matan	Gadadhardi ...	0 5 0	1 0 0	25-11-14	10-3-15	12 18 0	31 2 0	14 14 0	16 4 0	195 0 0
44	Shaikh Mojamel	Ditto ...	0 5 0	1 0 0	25-11114	10-0-15	8 34 0	22 2 0	15 15 0	6 4 0	75 0 0
45	Chap Mollik	Ditto ...	0 5 0	1 0 0	30-11-14	13-3-15	10 35 0	27 3 0	15 14 0	11 5 0	135 12 0
46	Eslam Khan	Ditto ...	0 5 0	1 0 0	30-11-14	10-3-15	11 22 0	28 14 0	16 14 0	12 0 0	144 0 0
47	Shaikh Abdul	Daharpur ...	0 5 0	1 0 0	30-11-14	10-3-15	8 34 0	22 2 0	15 14 0	6 4 0	75 0 0
48	,, Gadu	Ditto ...	0 2 8	0 20 0	30-11-14	10-3-15	5 11 3	19 3 0	7 7 0	5 12 0	138 0 0
49	Babur Ali Matubbar	Ditto ...	0 2 8	0 20 0	30-11-14	10-3-15	4 32 0	12 0 0	7 7 0	5 7 0	130 8 0
50	Ashwani Kumar Dhar ...	Ditto ...	0 2 0	0 20 0	25-11-14	4-3-15	2 35 0	7 3 0	6 7 0	0 12 0	22 8 0
51	Rahan Khapali	Gangadhurdi	0 5 0	1 0 0	25-11-14	4-3-15	12 18 0	31 2 0	15 14 0	15 4 0	183 0 0
52	Elam Mollik	Ditto ...	0 5 0	1 0 0	25-11-14	4-3-15	10 25 0	26 9 0	15 14 4	10 11 0	128 4 0
53	Shaben Mattan	Khaminar Bag	0 2 0	0 22 0	26-11-14	8-3-15	3 24 0	9 0 0	7 7 0	2 7 0	76 14 0
54	Sabdan Shikdan	Chan Patti ...	0 2 8	0 20 0	26-11-14	8-3-15	4 21 0	11 5 0	7 7 0	3 14 0	93 0 0
55	Shaikh Jaypal	Daharpur ...	0 3 0	0 35 0	26-11-14	8-3-15	6 0 0	20 0 0	11 7 3	9 8 9	187 13 0
56	Derajuddin	Muknampatti	0 5 0	1 6 0	35-11-14	10-3-15	10 0 0	25 0 0	15 14 0	10 14 0	130 8 0
57	Akaban Matubbar	Dahanpur ...	0 1 0	0 10 0	25-11-14	10-3-15	16 0	3 8 0	3 3 6	0 4 6	16 14 0

APPENDIX VII—*contd.*

Faridpur—contd.

Serial No.	Names of cultivators.	Village.	Area of plot.	Quantity of seeds.	Date. Sowing.	Date. Harvesting.	Outturn.	Price of outturn.	Cost of cultivation and price of seeds.	Profit. Per plot.	Profit. Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K. CH.	MD. S. CH.			MD. S. CH.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
58	Sarajuddi	Dahanpur ...	0 10 0	1 25 0	25-11-14	10-3-15	14 25 0	36 9 0	22 10 9	13 14 0	83 5 6
59	Shaikh Abed	Makuampatti	0 1 0	8 10 0	27-11-14	10-3-15	2 6 0	5 6 0	3 11 6	1 10 6	100 2 0
60	Akaban Shikdan	Champatti ...	0 1 0	0 10 9	27-11-14	10-3-15	3 2 0	7 10 0	3 11 0	3 14 6	234 6 0
61	Napal Hazi	Dahanpur ...	0 5 0	0 25 0	30-11-14	8-3-15	5 12 0	13 4 0	9 12 3	3 7 9	69 6 0
62	Shaikh Derajuddi	Ditto ...	0 2 8	0 20 0	30-11-14	8-3-15	4 6 0	10 6 0	6 7 0	3 15 0	34 8 0
63	Kalakadir	Gangadhardi	0 10 0	2 0 0	11-11-14	9-3-15	8 36 0	22 4 0	24 12 0	...	...
64	Daliladdi Khondakar ...	Ditto ...	0 15 0	3 3 0	11-11-14	9-3-15	36 24 0	91 9 0	47 10 0	43 15 0	175 12 0
65	Shaikh Meher	Ditto ...	0 10 0	2 0 0	11-11-14	9-3-15	23 5 0	57 13 0	26 12 0	31 1 0	186 6 0
66	Kadir Khondakar	Ditto ...	0 5 0	1 0 0	16-11-14	10-3-15	7 26 0	19 2 0	14 14 0	4 4 0	66 12 0
67	Shaikh Paban	Ditto ...	0 5 0	1 0 0	16-11-14	10-3-15	6 33 0	17 1 0	14 14 0	2 3 0	26 4 0
68	,, Menu	Ditto ...	0 5 0	1 0 0	3-11-14	2-3-15	9 24 0	24 0 0	14 14 0	9 2 0	109 8 0
69	Hamiu Khan	Ditto ...	0 5 0	1 0 0	3-11-14	2-3-15	8 7 0	20 7 0	14 14 0	5 9 0	65 12 0
70	Haranullah	Ditto ...	0 10 0	2 0 0	10-12-14	12-3-15	16 38 0	42 6 0	26 12 0	15 10 0	93 12 0
71	Shaikh Kalimaddi	Ditto ...	0 12 0	2 25 0	18-11-14	10-3-15	24 6 0	60 6 0	38 8 9	22 1 3	110 11 6
72	,, Kasin	Ditto ...	0 5 0	1 0 0	10-11-14	11-3-15	12 3 0	30 3 0	16 14 0	14 5 0	171 12 0
73	Kalai Mollah	Ditto ...	0 5 0	1 0 0	15-11-14	11-3-15	10 8 0	25 8 0	16 14 0	8 10 0	103 8 0
74	Nasiraddi Matubbar	Ditto ...	0 1 0	0 15 0	15-11-14	11-3-15	3 2 0	7 10 0	6 1 3	1 4 9	77 13 0
75	Shaikh Baser	Ditto ...	0 1 0	0 10 0	15-11-14	12-3-15	2 26 0	6 10 0	3 11 6	2 10 6	159 6 0
76	Anoar Khan Munshi	Ditto ...	0 5 0	1 0 0	25-12-14	15-3-15	10 15 0	25 15 0	17 14 0	8 1 0	96 12 0
77	Jaynal Khan	Ditto ...	0 5 0	1 0 0	25-11-14	15-3-15	8 37 0	22 5 0	15 14 0	6 7 0	77 4 0
78	Shaikh Mabdun	Pachkul ...	0 15 0	2 25 0	20-11-14	8-3-15	22 26 0	56 10 0	35 8 9	21 1 3	84 3 9
79	Kanai Khan	Ditto ...	0 10 0	2 0 0	20-11-14	3-3-15	17 2 0	42 10 0	26 12 0	15 14 0	95 4 0
80	Shaikh Rustam	Gangadhardi	0 5 0	1 0 0	30-11-14	29-2-15	8 36 0	22 4 0	13 14 0	8 6 0	100 8 0
81	,, Faijaddi	Ditto ...	0 2 8	0 20 0	30-11-14	30-2-15	6 10 0	15 10 0	8 7 0	7 3 0	172 8 0
82	Rasir Khan	Ditto ...	0 1 0	0 10 0	4-12-14	15-3-15	2 3 0	5 3 0	3 11 6	1 7 6	91 2 0
83	Ohed Ali	Ditto ...	0 5 0	1 0 0	25-11-14	10-3-15	8 35 0	22 3 0	15 14 0	6 5 0	75 8 0
84	Amanath Khan	Ditto ...	0 5 0	1 0 0	25-11-14	8-3-15	9 31 0	24 7 0	15 14 0	8 9 0	102 12 0
85	Nasiraddi Munshi	Ditto ...	0 5 0	1 0 0	20-11-14	10-3-15	12 4 0	30 4 0	15 14 0	14 6 0	172 8 0
86	Nadu Khan	Ditto ...	0 2 8	0 20 0	20-11-14	9-3-15	5 32 0	14 8 0	8 7 0	6 1 0	145 8 0
87	Mojamer Fakir	Saripabad ...	1 15 0	7 0 0	18-11-14	9-3-15	72 18 0	171 2 0	111 2 0	60 0 0	102 12 0
88	Answaruddin	Ditto ...	0 5 0	1 0 0	6-11-14	10-3-15	9 25 0	24 1 0	15 14 0	8 3 0	97 8 0
89	Shaikh Kanu	Ditto ...	0 10 0	2 0 0	20-11-14	10-3-15	17 22 0	44 2 0	31 12 0	12 6 0	74 4 0
90	,, Daliladdi	Ditto ...	0 5 0	1 0 0	20-11-14	10-6-15	11 20 0	28 12 0	15 14 0	12 14 0	154 0 0
91	,, Moffijaddi	Ditto ...	0 5 0	1 20 0	20-11-14	10-3-15	14 13 0	36 5 0	21 5 0	15 0 0	180 0 0
92	,, Gafur	Ditto ...	0 10 0	2 0 0	10-11-14	12-3-15	20 7 0	50 7 0	31 12 0	18 11 0	112 2 0
93	,, Aijaddi Choukider ...	Ditto ...	0 5 0	1 0 0	25-11-14	13-3-15	9 9 0	22 8 0	15 14 0	6 10 3	79 8 0
94	,, Baran	Ditto ...	0 10 0	2 0 0	8-11-14	12-3-15	18 25 0	46 9 0	31 12 0	14 13 0	88 14 0
95	,, Anfu	Ditto ...	0 10 0	2 0 0	10-11-14	15-3-15	21 26 0	54 2 0	31 12 0	22 6 0	133 12 0
96	Exfanuddin	Ditto ...	0 5 0	1 0 0	15-11-14	10-3-15	8 33 0	20 1 0	10 14 0	10 3 0	121 8 0
97	Shaikh Hatem	Ditto ...	0 15 0	3 0 0	15-11-14	12-3-15	35 8 0	87 8 0	47 10 0	39 14 0	159 8 0
98	,, Basiraddi	Ditto ...	0 5 0	1 0 0	10-11-14	10-3-15	8 25 0	21 9 0	15 14 0	5 7 0	65 6 0
99	,, Nazem	Ditto ...	0 10 0	2 0 0	15-11-14	9-3-15	12 16 0	31 0 0	29 12 0	1 4 0	7 0 0
100	,, Kader	Ditto ...	0 5 0	1 0 0	10-11-14	10-3-15	6 3 0	15 3 0	13 14 0	1 5 0	15 12 0
101	Amiraddi Mollah	Ditto ...	0 5 0	1 0 0	15-11-14	4-3-15	10 11 0	25 11 0	15 14 0	9 13 0	117 12 0
102	Offajaddi	Ditto ...	0 5 0	1 0 0	20-11-14	10-3-15	5 23 0	14 12 0	15 14 0	...	...
103	Adiluddi	Ditto ...	0 5 0	1 0 0	25-11-14	8-3-15	12 18 0	31 2 0	15 14 0	15 2 0	181 8 0
104	Abduschatar Khalifa ...	Hazankanda...	0 5 0	1 0 0	12-11-14	3 3-15	5 32 0	14 8 0	15 14 0	.....	.....
105	Kohiladdi	Ditto ...	0 7 0	1 20 0	12-1-14	1-3-15	8 26 0	21 10 0	15 14 0	6 0 0	51 8 0
106	Monirad'n	Ditto ...	0 5 0	1 0 0	12-11-14	15-3-15	10 2 0	25 2 0	15 14 0	9 4 0	111 0 0
107	Menajaddin Hazi	Ditto ...	0 5 0	1 0 0	12-11-14	15-3-15	12 6 0	30 6 0	15 15 0	14 7 0	123 4 0
108	Rohimoddi	Ditto ...	0 7 0	1 20 0	12-11-14	10-3-15	18 0 0	45 0 0	21 6 6	23 9 0	202 3 6
109	Fazlar Rahaman Khondakar ...	Ditto ...	0 2 8	0 20 0	10-11-14	8-3-15	4 10 0	15 10 0	10 7 6	5 2 0	123 12 9
110	Kazi Aptauddin	Hazuakanda	0 2 8	0 20 0	12-11-14	15-3-15	3 15 0	8 7 0	7 15 6	0 7 6	11 4 0
111	Mohon Shaik	Ditto ...	0 7 0	1 20 0	10-11-14	15-3-15	13 25 0	34 1 0	23 6 6	10 10 6	91 5 6
112	Baban Mollik	Fatepatti ...	0 5 0	1 0 0	12-11-14	10-3-15	10 9 0	25 9 0	15 15 0	9 6 0	112 8 0
113	Moniraddi Shaik	Do. ...	0 5 0	1 0 0	12-11-14	10-3-15	12 25 0	31 9 0	15 15 0	15 10 0	187 8 0
114	Shaik Ahadi	Do. ...	0 2 8	0 20 0	12-11-14	10-3-15	3 8 0	8 0 0	7 15 6	0 0 6	0 12 0
115	Jamir Mollah	Do. ...	0 3 0	0 25 0	10-11-14	15-3-15	5 27 0	14 3 0	9 13 9	4 5 3	86 9 0
116	Karim Mollah	Do. ...	1 0 0	4 0 0	12-11-14	15-3-15	43 22 0	108 6 0	53 8 0	54 14 0	164 10 0
117	Arman Ullah	Do. ...	0 5 0	1 0 0	15-11-14	30-3-15	7 18 0	18 10 0	15 15 0	2 11 0	32 4 0
118	Jan Mamud	Do. ...	0 1 0	0 10 0	15-11-14	30-3-15	3 2 0	7 10 0	3 7 9	4 2 3	248 7 0
119	Esan Kazi	Chunurdi ...	0 5 0	1 0 0	10-11-14	8-3-15	13 3 0	32 10 0	15 15 0	16 11 0	200 4 0
120	Aijaddi Mushi	Do. ...	0 5 0	1 0 0	10-11-14	8-3-15	8 2 0	20 2 0	15 15 0	4 3 0	50 4 0
121	Shaik Esub	Do. ...	0 5 0	1 0 0	15-11-14	10-3-15	8 33 0	22 1 0	15 15 0	6 2 0	73 8 0
122	Offajaddi Mollah	Do. ...	0 5 0	1 0 0	10-11-14	9-3-15	9 35 0	24 11 0	15 15 0	8 12 0	105 0 0
123	Kohiladdin Mollah	Do. ...	0 5 0	1 0 0	15-11-14	15-3-15	8 28 0	21 12 0	15 15 0	5 13 0	69 12 0
124	Janai Khan	Do. ...	0 5 0	1 0 0	15-11-14	10-3-15	8 28 0	21 15 0	15 15 0	5 13 0	69 12 0
125	Shaik Makbul	Do. ...	0 5 0	1 0 0	10-11-14	10-3-15	11 38 0	29 14 0	15 15 0	13 15 0	167 4 0
126	Ajgar Shaik	Parer Char ...	0 5 0	1 0 0	12-11-14	15-3-15	10 26 0	26 10 0	15 15 0	10 10 0	127 8 0
127	Amiraddi Matabbar	Ditto ...	0 8 0	2 22 0	13-11-14	4-3-15	21 33 0	54 10 0	30 14 4	23 11 8	177 15 6
128	Shaik Gagan	Ditto ...	0 5 0	1 0 0	13-11-14	4-3-15	7 25 0	19 1 0	15 15 0	3 2 0	37 8 0
129	,, Baser	Ditto ...	0 5 0	1 0 0	10-11-14	8-3-15	8 33 0	22 1 0	15 15 0	6 2 0	75 0 0
130	Noai Mollah	Ditto ...	0 5 0	1 0 0	9-11-14	20-3-15	7 18 0	18 10 0	15 16 0	2 11 0	32 4 0
131	Emin Khan	Ditto ...	0 5 0	1 0 0	9-11-14	20-3-15	10 9 0	25 5 0	15 15 0	5 10 2	67 8 0
132	Shaik Menajaddi	Khandia ...	0 5 0	1 0 0	8-11-14	10-3-15	5 27 0	14 3 0	15 15 0	.....	.....
133	Anes Shaik	Anapur ...	0 5 0	1 0 0	10-11-14	4-3-15	12 25 0	31 9 0	15 15 0	15 0 0	187 8 0
134	Mesen Talukder	Saildubi ...	0 10 0	1 32 0	10-11-14	10-3-15	12 10 0	30 10 0	29 7 1	0 14 11	5 9 6
135	Anes Mollah	Biswambardi	0 5 0	1 0 0	15-11-14	15-3-15	11 33 0	29 14 0	15 14 0	13 15 0	167 4 0
136	Jabbar Munshi	Saripabad ...	0 2 8	0 20 0	15-11-14	15-3-15	3 15 0	8 7 0	7 15 6	0 7 6	11 10 0
137	Aptenuddin Ahammad	Sarsakandi ...	0 10 0	2 0 0	8-11-14	10-3-15	20 0 0	50 6 0	31 14 0	18 2 0	108 12 0
138	Chabdu Munshi	Baila ...	0 4 0	1 0 0	15-11-14	10-3-15	10 26 0	26 10 0	15 15 0	10 11 0	128 12 0
139	Arabdi Shaik	Do. ...	0 10 0	2 0 0	15-11-14	10-3-15	18 31 0	44 15 0	31 14 0	13 1 0	78 6 0
140	Samiraddi	Do. ...	0 5 0	1 0 0	15 11-14	10-3-15	17 18 0	18 10 0	15 15 0	2 11 0	32 4 0
141	Ebrahim Biswas	Goal Paldi ...	0 5 0	1 16 0	10-11-14	4-3-15	14 8 0	36 0 0	22 3 0	9 12 0	117 0 0
142	Benajaddi Shaik	Ditto ...	0 2 8	0 20 0	10-11-14	4-3-15	3 15 0	8 7 0	7 15 6	0 7 6	11 4 0
143	Dabiruddi Mollah	Ditto ...	0 5 0	1 0 0	10-11-14	10-3-15	11 34 0	29 14 0	15 15 0	13 15 0	167 4 0
144	Chaitanne Mistri	Ditto ...	0 5 0	...	10-11-14	10-3-15	17 18 0	18 10 0	15 15 0	2 11 0	32 4 0
145	Payari Mondal	Ditto ...	0 1 0	0 10 0	10-11-14	10-3-15	3 2 0	7 10 0	3 7 0	4 2 3	24 9 0
146	Kali Charan Mondal	Ditto ...	0 1 0	0 1 0	10-11-14	10-3-15	3 0 0	7 8 0	3 7 0	4 0 0	240 6 0
147	Mr. S. M. Bose	Gopalganj ...	1 5 0	4 0 0	15-10-14	23-2-15	46 0 0	138 0 0	65 12 0	72 4 0	173 6 6
148	Moulavi Asad Jaman	Ditto ...	0 5 0	1 15 0	25-10-14	17-2-15	11 0 0	33 0 0	19 0 0	14 0 0	168 0 0
149	,, Janab Ali	Ditto ...	0 1 0	0 10 0	21-10-14	13-2-15	0 16 0	1 3 3	3 4 5	Loss.	Loss.
150	Rajani Kanta Ghosh	Ditto ...	0 2 0	0 25 0	12-10-14	1-2-15	7 36 0	23 11 3	8 5 10½	15 5 4½	460 1 3
151	Jadab Ch. Chakraborty ...	Ditto ...	0 1 0	0 7 0	10-10-14	4-3-15	1 20 0	4 8 0	2 12 6	1 11 6	65 19 9
152	Baikuntha Nath Chanda ...	Ditto ...	0 0 8	0 5 0	20-10-14	4-3-15	1 5 0	3 6 0	1 12 4½	1 9 7½	190 1 0
153	Srish Ch. Chakraborty ...	Ditto ...	0 2 0	0 15 0	30-10-14	2-3-15	4 15 0	13 2 0	5 14 1½	7 3 10½	217 4 9
154	Kailash Ch. Karmakar ...	Ditto ...	0 1 0	0 10 0	15-10-14	4-2-15	3 0 0	9 0 0	3 8 9	5 7 3	327 4 9
155	Srikanta Das Gupta	Ditto ...	0 0 8	0 6 0	21-10-14	28-2-15	1 0 0	3 0 0	0 6 0	0 15 6	116 3 0
156	Jamini K. Rakhit	Ditto ...	0 1 0	0 10 0	21-10-14	26-2-15	3 0 0	9 0 0	3 8 9	5 7 3	327 3 0
157	Priya Nath Mitra	Ditto ...	0 1 0	0 10 0	16-10-14	20-2-15	3 0 0	9 0 0	3 8 9	5 7 3	327 3 0
158	Akshay K. Chowdhury	Ditto ...	0 0 8	0 4 0	21-10-14	25-2-15	0 8 0	1 9 6	1 4 6	Loss.	Loss.
159	Moulavi Abdul Kader	Ditto ...	0 5 0	0 37 8	19-11-14	23-2-15	12 10 0	36 12 0	14 6 9	22 5 3	268 5 0

APPENDIX VII—*concld.*

Faridpur—concld.

Serial No.	Names of cultivators.	Village.	Area of land.	Quantity of seeds.	Date. Sowing.	Date. Harvesting.	Outturn.	Price of outturn.	Cost of cultivation and price of seeds.	Profit. Per plot.	Profit. Per acre.
1	2	3	4	5	6	7	8	9	10	11	12
			B. K. CH.	M. S. CH.			MD. S. CH.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
160	Jogendra Ch. Bhattacharjee ...	Gopalganj ...	0 0 8	6 4 0	20-11-14	22-2-15	1 0 0	3 0 0	1 4 6	1 11 6	206 4 0
161	Sashi Kumar Bose ...	Ditto ...	0 5 0	0 33 0	22-11-14	28-2-15	4 20 0	13 8 0	13 6 0	0 2 0	1 8 0
162	Gopal Ch. Mukharjee ...	Ditto ...	0 1 8	0 11 0	22-11-14	29-2-15	3 5 0	9 6 0	4 4 8	5 1 4	203 5 4
163	Abdul Gafur	Ditto ...	0 0 8	0 3 0	21-11-14	22-2-15	1 12 0	3 14 6	1 12 4½	2 2 1½	255 15 0
164	Kunjalal Ghose	Ditto ...	0 0 8	0 3 0	13-11-14	21-2-15	0 30 0	2 4 0	1 4 6	0 15 6	232 8 0
165	Basanta Kumar Deb ...	Ditto ...	0 0 4	0 1 0	13-11-14	27 2-15	0 12 0	0 14 6	0 8 0	0 6 6	97 8 0
166	Purna Chandra Dey ...	Ditto ...	0 0 4	0 1 0	13-11-14	20-2-15	0 13 0	0 15 6	0 8 0	0 7 6	112 8 0
167	Karmadhar Mullik ...	Gopinathpur	0 12 0	2 0 0	25-10-14	28-2-15	25 0 0	75 0 0	32 6 0	42 10 0	113 2 0
168	Bishnu Ch. Chowdhury ...	Ditto ...	0 6 0	1 0 0	25-10-14	29-2-15	13 12 0	39 14 6	16 3 0	23 11 3	237 3 0
169	Chandi Charan Biswas ...	Ditto ...	0 1 8	0 15 0	26-10-14	23-2-15	7 5 0	21 6 0	5 5 1½	16 0 10½	640 5 0
170	Fedu Biswas	Ditto ...	0 5 0	1 0 0	26-10-14	2-3-15	16 20 0	49 8 0	15 3 0	34 5 0	411 12 0
171	Kumud Bandhu Biswas ...	Ditto ...	0 6 0	1 0 0	26-10-14	2-3-13	16 20 0	49 8 0	16 3 0	33 5 0	333 2 0
172	Chak Mohan Roy	Girishnagar ...	0 1 0	0 10 0	20-10-14	2-3-15	3 6 0	9 7 3	3 8 9	5 14 6	354 6 0
173	Jaladhar Sarker	Borasi ...	0 2 0	0 15 0	20-10-14	2-3-15	4 10 0	12 12 0	5 13 1½	6 14 10½	267 13 0
174	Kali Charan Mandal	Khatra ...	0 2 8	0 20 6	15-10-14	16-2-15	6 0 0	18 0 0	7 9 6	10 6 6	249 12 0
175	Munshi Kafiuddin	Bedgram ...	0 3 0	0 18 0	20-11-14	17-2-15	5 32 0	17 6 6	7 9 6	9 13 0	196 4 0
176	,, Abul Bari	Patgathi ...	0 1 8	0 10 0	18-10-14	17-2-15	3 5 0	15 6 0	4 0 9	11 5 3	455 2 0
177	Kutiswar Biswas	Char Madhupur	0 7 0	1 22 0	21-11-14	28-2-15	6 30 0	20 4 0	23 0 6	Loss.	
178	Biswanath Pramanik	Pachuria ...	0 1 8	0 10 0	15-10-14	2-3-15	3 10 0	9 12 0	4 0 9	5 11 3	228 2 0
179	Joydeb Biswas	Padmabilla ...	0 0 8	0 5 0	20-10-14	27-2 15	1 20 0	4 8 0	1 12 4½	2 11 5½	325 15 0
180	Bepin Behary Sikdar	Tilchara ...	0 8 0	1 20 0	26-10-14	24-2-15	21 10 0	63 12 0	23 4 6	40 7 6	303 8 3
181	Rati Kanta Biswas	Pachail ...	0 5 0	1 0 0	26-10-14	23-2-15	13 10 0	39 12 0	15 3 0	24 9 0	294 12 0
182	Ahamad Molla	Paranpur ...	0 5 0	1 0 0	26-10-14	22-2-15	13 10 0	39 12 0	15 3 0	24 9 0	294 12 0
183	Munshi Naziruddin	Ghoseapara ...	0 1 0	0 19 0	26-10-14	24-2-15	6 20 0	19 8 0	3 8 9	15 15 3	957 3 0

POTATO CULTIVATION, 1914.

Barisal.

No.	Names of cultivators.	Village.	Area of land in acres.	Quantity of seed.	Outturn.	Price of outturn.	Price of seeds.	Profit. Per plot.	Profit. Per acre.
1	2	3	4	5	6	7	8	9	10
				MD. S. CH.	MD. S. CH.	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
1	Abdul Haque	Kalia ...	·16	0 19 0	2 10 0	5 10 0	4 12 0	0 14 0	5 7 6
2	Abdul Haque Panchayet ...	Do. ...	·16	0 19 0	2 20 0	6 4 0	4 12 0	1 8 0	9 6 0
3	Gafaraji Sikdar	Do. ...	·08	0 10 0	1 20 0	3 12 0	2 8 0	1 4 0	15 10 0
4	Mahammed	Do. ...	·08	0 10 0	1 18 0	3 10 0	2 8 0	1 2 0	14 1 0
5	Kamaluddy	Do. ...	·16	0 19 0	2 20 0	6 4 0	4 12 0	1 8 0	9 6 0
6	Phaju	Do. ...	·08	0 10 0	1 20 0	3 12 0	2 8 0	1 4 0	15 10 0
7	Karimali	Do. ...	·01	0 5 0	0 25 0	1 9 0	1 4 0	0 5 0	31 4 0
8	Munshurali	Do. ...	01	0 5 0	0 35 0	2 3 0	1 4 0	0 15 0	93 12 0
9	Imanaddi	Do. ...	·01	0 5 0	0 27 0	1 11 0	1 4 0	0 7 0	43 12 0
10	Achimaddi	Daspara ...	·08	0 7 0	0 20 0	3 12 0	1 12 0	2 0 0	25 0 0
11	Ohadali Peon	Baufal ...	·24	0 30 0	0 35 0	9 11 0	7 8 0	2 3 0	9 1 9
12	Deb Narayan Roy	Royer Kati	·03	0 10 0	2 0 0	5 0 0	2 8 0	2 8 0	5 4 0
13	Mahamed Abdul Gani ...	Telikhali ...	·13	0 30 0	3 36 0	9 6 0	7 8 0	1 14 0	6 9 0
14	Tanu Howladur	Maderkaty	·35	2 0 0	10 0 0	25 0 0	20 0 0	5 0 0	4 9 0
15	Elemaddi Howladar ...	Ditto ...	·33	1 0 0	4 10 0	10 0 0	10 0 0	0 10 0	14 4 0
16	Mr. Brown	Al kanda ...	·33	1 0 0	7 0 0	17 8 0	10 0 0	7 8 0	22 11 8
17	Rai M. N. Sen Bahadur ...	Barisal ...	·37	1 0 0	10 30 0	26 14 0	10 0 0	16 14 0	45 9 9
18	Hamijaddi	Charadi ...	·16	0 20 0	2 20 0	6 4 0	5 0 0	1 4 0	7 13 0
19	Thakurali	Ditto ...	·33	1 0 0	6 0 0	15 0 0	10 0 0	5 0 0	15 2 3
20	Abhoy Chandra Ghose ...	Ganapara ...	·26	0 25 0	7 0 0	17 8 0	6 4 0	11 4 0	43 4 4
21	Ismail Chaukidar	Ichakati ...	16	0 15 0	8 0 0	20 0 0	3 12 0	16 4 0	101 9 0
22	Nilkanta Deori	Madhabpasa	·33	1 0 0	9 0 0	22 8 0	10 0 0	12 8 0	14 1 0
23	Rahimuddi Howladar ...	Kristopur ...	·33	1 0 0	2 12 0	5 12 0	10 0 0	.....	.....
24	Kailash Chandra Bose ...	Ramchandra-pur.	·06	0 4 0	0 20 0	1 4 0	1 0 0	0 4 0	4 2 0
25	Jaimaddi	Barisal ...	·08	0 6 0	1 26 0	4 2 0	1 8 0	2 10 0	32 13 0
26	Kali Prasanna Banerjee ...	Bhola ...	·15	0 22 0	8 3 0	20 3 0	5 8 0	14 11 0	97 14 9
27	Lalit Mohon Mukharjee ...	Paranganj ...	·07	0 10 0	3 0 0	7 8 0	2 8 0	5 0 0	71 6 9
28	Abhoy Kumar Roy	Muhurjung	·18	0 20 0	5 0 0	12 8 0	5 0 0	7 8 0	41 10 9
29	Mijan Pandit	Gangapur ...	·04	0 7 0	1 32 0	4 8 0	1 12 0	2 12 0	68 12 0
30	Satish Chandra Guha ...	Barhanaddi	·37	0 20 0	10 0 0	25 0 0	5 0 0	20 0 0	54 1 0
31	Abdul Gani	Malti ...	·37	1 20 0	15 0 0	37 8 0	15 0 0	22 8 0	60 13 0
32	Abdul Karim	Do. ...	·37	1 0 0	10 20 0	26 4 0	10 0 0	16 4 0	45 0 0
33	Joynal Munshi	Do. ...	·37	1 0 0	14 20 0	36 4 0	10 0 0	26 4 0	70 15 3
34	Khosal	Do. ...	·18	0 20 0	4 0 0	10 0 0	5 0 0	5 0 0	27 12 6
35	Kaminaddi	Do. ...	·37	1 0 0	10 0 0	25 0 0	10 0 0	15 0 0	40 8 9
36	Makbul Ahamed	Do. ...	·07	0 10 0	1 10 0	3 2 0	2 8 0	0 10 0	18 14 6

APPENDIX VIII.

DACCA.

List of cowdung conservation pits.

Number.	Names of cultivators.	Village.	Number of pits.
1	2	3	4
1	Kamini Kumar Mullick ...	Brahmandi ...	1
2	Askar Ali	Bowadi ...	1
3	Jagat Chandra Day ...	Shibnandi ...	1
4	Abdul Rahim ...	Gagatia ...	1
5	Ismail	Huglakandi ...	1
6	Maniruddin	Daulatkandi ...	1
7	Abdul Gafur ...	Ditto ...	1
8	Shaharali	Asrabpur ...	1
9	Gadadhar Mistry ...	Pagla ...	1
10	Ramidhan Mistry ...	Kamalpur ...	1
11	Rajendra Kumar Dutta ...	Sheharchar ...	1
12	Ramchandra Mistry ...	Godhail ..	1
13	Pandav Biswas ...	Do. ...	1
14	Radha Charan Gope ...	Fatulla ...	1
15	Bochai Sirkar ...	Tegharia ...	1
16	Lakshmi Mistry ...	Ditto ...	1
17	Chandranath Sirkar ..	Ditto ...	1
18	Purna Mandal ...	Akrabari ...	1
19	Ramsundar Bepari ...	Arakul ...	1
20	Debendra Nath Sil ...	Do. ...	1
21	Monmohan Das ...	Pubdi ...	1
22	Haladhar Mistry ...	Nalban ...	1
23	Asananda Mandal ...	Basbari ...	1
24	Haladhar Mandal ...	Ditto ...	1
25	Ramananda Mandal ...	Ditto ...	1
26	Shaikh Adam ...	Katasur ...	1
27	Shaikh Kerali ...	Nayagaon ...	1
28	Sagir Mahmud ...	Markoom ...	1
29	Ramsankar Sirkar ...	Duttapara ...	1
30	Panchkowori Mandal ...	Katara ...	1
31	Sekandar Hazi ...	Bagbari ...	1
32	Kristo Kumar Madbar ...	Sudharchar ...	1
33	Monmohan Barui ...	Imamerchar ...	1
34	Dengar Khan ...	Kusumpur ...	1
35	Badshahi Haldar ...	Ditto ...	1
36	Hari Mandal ...	Sridharkhola ...	1
37	Panchananda Mandal ...	Ditto ...	1
38	Gosaidas Mandal ...	Ditto ...	1
39	Sona Mollah ...	Rasakati ...	1
40	Rupnuddi Sheikh ...	Ditto ...	1
41	Sheikh Meherali ...	Baligaon ...	1
42	Bakshi Mahamad ...	Ditto ...	1
43	Sanatan Mandal ...	Angaira ...	1
44	Nanda Kumar Mandal ...	Ditto ...	1
45	Prohlad Mandal ...	Kanainagar ...	1
46	Lalbehari Kaviraj ...	Chakighata ...	1
47	Shibnath Bepari ...	Ditto ...	1
48	Abdul Rashid ...	Ramnagar ...	1
49	Sheikh Kadir ...	Golachipa ...	1
50	Salim Bepari ...	Ramnagar ...	1

APPENDIX VIII—*contd.*

MYMENSINGH.

List of cowdung conservation pits, 1914.

Number.	Names of cultivators.	Village.	Number of pits.
1	2	3	4
1	Shaikh Jabber	Golgonda ...	1
2	Setu Mandal	Do. ...	1
3	Girish Chandra Dev	Khagdahar ...	1
4	Jabu Sircar	Kalyanpur ...	1
5	Shaikh Sharip	Khagdahar ...	1
6	Rahim Chopdar	Dariapur ...	1
7	Santi Chandra Mazumdar ...	Thakurakona ...	1
8	Abdul Mazid	Barshikura ...	1
9	Harish Chandra Biswas ...	Ramshid ...	1
10	Nibaran Chandra Mazumdar ...	Thakurakona ...	1
11	Nanda Kishore Nath	Ditto ...	1
12	Kamini Kumar Das	Shalpapaguli ...	1
13	Hamiluddin Khan	Katlee ...	1
14	Hafizuddin Khan	Do. ...	1
15	Shaikh Amir	Deola ...	1
16	Krishna Sundar Sircar ...	Guptergaon ...	1
17	Bhairab Prosad Singha ...	Gadaria ...	1
18	Shubal Shaikh	Chakdeola ..	1
19	Sabi Munshi	Mirzapur ...	1
20	Meharulla Khan	Maijbari ...	1
21	Samiruddin Munshi	Do. ...	1
22	Nabu Sircar	Alipur ...	1
23	Dwarika Nath Chanda ...	Do. ...	1
24	Himnat Bepari	Bairan ...	1
25	Badaruddin Fakir	Do. ...	1
26	Intazuddin Khandakar ...	Dampara ...	1
27	Iasin Sircar	Ashuria ...	1
28	Kabil Munshi	Do. ...	1
29	Jinnatali Ahamed	Akashi ...	1
30	Amiruddin Ahamed	Tikri ...	1
31	Akali Duftry	Rajerbag ...	1
32	Abdul Jabber Kazi	Malaori ...	1
33	Abhoy Chandra Sukladas ...	Charsolakia ...	1
34	Niamat Munshi	Ghaital ...	1
35	Mamud Charu	Do. ...	1
36	Sayedali Shaikh	Do. ...	1
37	Ablash Shaikh	Do. ...	1
38	Jamir Shaikh	Do. ...	1
39	Ibu Mandal	Sreedharkhila ...	1
40	Ibrahim Shaikh	Ditto ...	1
41	Asanulla Shaikh	Charsolakia ...	1
42	Nazir Bhuiya	Solakia ...	1
43	Sonadhar Shaikh	Rashidabad ...	1
44	Sharui Mandal	Akashi ...	1
45	Goba Mandal	Do. ...	1
46	Rupa Mandal	Do. ...	1
47	Taib Shaikh	Baira ...	1
48	Tazimuddin Ahamed	Do. ...	1
49	Jair Mandal	Do. ...	1
50	Akbarali Shaikh	Do. ...	1
51	Munshi Manitulla	Malipara ...	1
52	Manu Mandal	Baira ...	1
53	Shebatulla Bepari	Guptergaon ...	1
54	Dhutraj Sircar	Ditto ...	1
55	Ishan Chandra Sil	Mokamia ...	1
56	Shaikh Jarip	Guptergaon ...	1

APPENDIX VIII—*contd.*

MYMENSINGH—*concld.*

List of cowdung conservation pits, 1914.

Number.	Names of cultivators.	Village.	Number of pits.
1	2	3	4
57	Shaikh Rahimuddin	Chotashunai ...	1
58	Shaikh Mamin	Ditto ...	1
59	Kashi Nath Sircar	Guptergaon ...	1
60	Abbasali Fakir	Chakdeola ...	1
61	Rangu Mandal	Chaksunai ...	1
62	Chandra Kishore Sircar ...	Dariamamudpur ...	1
63	Shaikh Taleb	Payari ...	1
64	Shaikh Dinu	Do. ...	1
65	Shaikh Samir	Do. ...	1
66	Shaikh Izat Sircar	Do. ...	1
67	Rahimuddin Sircar	Narikeltola ...	1
68	Mafizuddin Ahamed	Godaria ...	1
69	Shaikh Adamali	Dewla ...	1
70	Mojafar Peda	Do. ...	1
71	Jabu Sircar	Kalyanpur ...	1
72	Eadali Shaikh	Baigunbari ...	1
73	Forman Bepari	Ditto ...	1
74	Iasin Fakir	Bairan ...	1
75	Kangu Bepari	Charalgi ...	1
76	Ismail Shaikh	Do. ...	1
77	Mamudali Shaikh	Do. ...	1
78	Alim Bepari	Do. ...	1
79	Kalim Sircar	Do. ...	1
80	Barkat Munshi	Do. ...	1
81	Nasaruddin Khan	Do. ...	1
82	Sadir Shaikh	Dumree ...	1
83	Abdul Aziz	Jogadal ...	1
84	Mamudali Shaikh	Ghaital ...	1
85	Shaikh Najoo	Jagadal ...	1
86	Nanda Kumar Sen	Kumree ...	1
87	Jaharali Munshi	Nagra ...	1
88	Santi Mazumdar	Thakurakona ...	1
89	Nripendra Mazumdar	Ditto ...	1
90	Bhusan Namasudra	Ditto ...	1
91	Jogendra Chandra Dey ...	Kunree ...	1
92	Maulvi Ahamed	Shyamganj ...	1
93	Mohiuddin	Medini ...	1
94	Surendra Chandra Chowdhury ...	Rameswarpur ...	1
95	Jogendra Chowdhury	Shibnagar ...	1

APPENDIX VIII—*contd.*

Serial No.	Names of cultivators.	Address.	Number of pits.
1	2	3	4
1	Moulavi Muhammad Ekram ...	Post office Faridpur, village Kamalpur.	1
2	Sefatulla Hazi	Post office Faridpur, village Char Kamalpur.	1
3	Sefatulla Hazi	Ditto ...	1
4	Aijuddi Shek	Ditto ...	1
5	Maulavi Abdul Gafur Khondokar	Kaijuri, Kafura ...	1
6	Rahamatulla Khan	Raghunandanpur, Faridpur.	1
7	Eashhin Mondal	Ditto ...	1
8	Bhuban Chandra Das	Char Sultanpur, Haziganj.	1
9	Gadai Bepari	Joair Kafura ...	1
10	Ghena Matabbar	Ditto ...	1
11	Abdul Gafur	Nurpur, Bhanga ...	1
12	Aijuddi	Ditto ...	1
13	Naziruddi Molla	Ditto ...	1
14	Sheik Gani	Charkanda, Bhanga	1
15	Gayejuddi Bepari	Ghaura, Bhanga ...	1
16	Aijuddi Shikdar	Ditto ...	1
17	Ofajaddi	Gangadhardi, Bhanga.	1
18	Omedali	Ghaura, Bhanga ...	1
19	Sheik Gayejaddi	Ditto ...	1
20	Nasir	Ditto ...	1
21	Paresulla Sheikh I	Benodepur, Rajbari	2
22	Paresulla Sheikh II	Ditto ...	1
23	Paresalla Bepari	Ditto ...	2
24	Jatai Sheikh	Ditto ...	1
25	Derajuddi Sheikh	Ditto ...	1
26	Manik Mandal	Ditto ...	1
27	Salimuddin Sardar	Dadshi, Rajbari ...	1
28	Sadaruddin Mollah	Char-Jhinri, Habaspur.	1
29	Kamala Kanto Kapali	Manikpur village, Chandra Deghatia.	1
30	Madan Kapali	Ditto ...	1
31	Ram Charan Kapali	Ditto ...	1
32	Krishadhan Kapali	Ditto ...	1
33	Ram Das Kapali	Ditto ...	1
34	Prasanna Kapali	Ditto ...	1
35	Lakhi Kanto Kapali	Ditto ...	1
36	Chak Mohan Ray	Girisnagar, Chandra Dighatia P. O.	1
37	Kuteswar Biswas	Charmadupur village.	1
38	Panchanan Biswas	Char Busuria, Gopalgunge.	1

APPENDIX VIII—*concld.*

Number.	Names of cultivators.	Village.	Area of land.
1	2	3	4
	BAKARGANJ.		
1	Mr. Carry	Sagardi ...	1
2	Abdul Gani	Bagora ...	1
3	Ismail Chowkidar	Ichapur ...	1
4	Nilkanta Deori	Madhabpasa ...	1
5	Syed Muhammad Asraf ...	Karapur ...	1
6	Kurman Chowkidar	Ditto ...	1
7	Maher Ali	Sariktala ...	1
8	Gahur Ali	Ditto ...	1
9	Nawab Ali	Ditto ...	1
10	Abdul Haque Panchayet ...	Kalaia ...	1
11	Osman Ali	Charnoabad ...	1
12	Abdul Haque	Ditto ...	1
13	Dudmia	Angi ...	1

APPENDIX IX.

DACCA.

Green-manuring with Dhaincha for paddy.

			B. K. CH.
1	Mangal Chaukidar	Dinnadar ...	0 10 0
2	Shaikh Jhapa	Agargaon ...	0 4 0
3	Shaikh Kalim	Companibag ...	0 10 0

MYMENSINGH.

*Green-manuring of jute with sunn hemp.**

1	Samir Munshi	Maizbari ...	...
2	Bhola Nath Mala	Char Algi* ...	...
3	Gopi Mohan Mala	Ditto ...	...
4	Jahabox Shaikh	Ditto ...	...
5	Charu Shaikh	Ditto ...	...

FARIDPUR.

1	Naimaddin Biswas	Chartepurakandi ...	0 10 0
2	Sahiruddin Biswas	Ditto ...	0 10 0
3	Mahammad Ekram	Kamalapur ...	0 10 0
4	Sefatulla Hazi	Charkampur ...	0 5 0
5	Abdul Wahed Jotdar	Sovarampur ...	0 5 0

BAKARGANJ.

1	Nowbali Howladar	Sariktala ...	1 0 0†
2	Ismail Chaukidar	Ichakali ...	1 0 0
3	Babu Abhoy Kumar Ghose ...	Ganapara ...	1 0 0
4	Dwarika Nath Das	Silpara ...	1 0 0

* Result will be reported in next year.
† Pirojpur subdivision.

R. DAS GUPTA,

Supdt. of Agriculture, Dacca Division.

No. 140, dated Rajshahi, the 28th June 1915.

From—THE SUPERINTENDENT OF AGRICULTURE, Rajshahi Division,

To—The Director of Agriculture, Bengal (through the 2nd Deputy Director of Agriculture, Bengal).

I HAVE the honour to submit herewith the annual reports for the year 1914-15.

ANNUAL REPORT OF THE DEMONSTRATION WORK OF THE SUPERINTENDENT OF AGRICULTURE, RAJSHAHI DIVISION, 1914-15.

During the year under review I was assisted by a staff of two district officers and thirteen demonstrators. Babu Bhabatosh Datta, Divisional Inspector of Agriculture, was in charge of Pabna and Babu Binod Lal Mukherjee, District Inspector, in charge of Malda.

There were three demonstrators in the Rajshahi district, three in Pabna, three in Malda, two in Bogra, one in Jalpaiguri and one in Dinajpur.

The main items of demonstration were: (1) effect of bonemeal on winter paddy; (2) the superiority of the Darjeeling variety of potatoes to the local; (3) green manuring of potatoes with cowpea, *aman* paddy with *dhaincha* and jute with sun hemp; (4) conservation of cattle dung in covered pits; (5) residual demonstration in bonemeal; (6) introduction of the better classes of sugarcane in some of the districts; (7) seed selection in the field and (8) superiority of some of the modern implements, especially Meston plough, Planet Junior handhoe and Done.

Bonemeal demonstration.—There were altogether 115 plots which received bonemeal for the first time. Of these 37 were sown with *aus* paddy and the rest with *aman*.

The distribution of plots was as follows :—

District.		Aus.	Aman.
Rajshahi	...	18	10
Bogra	...	2	36
Dinajpur	...	9	5
Pabna	...	5	16
Malda	...	2	5
Jalpaiguri	...	1	6
Total	...	37	78

The manure gives a highly encouraging result in the district of Bogra and in part of Dinajpur (hillside) and in Northern Rajshahi. Its effect is also very encouraging in the district of Jalpaiguri. In the district of Rajshahi the manure was applied in the mulberry fields now under jute or *aus* paddy, and the result was quite good in the second and third year after application, and the effect of the manure extends even to the fourth year after its application.

The varieties of paddy with which bonemeal had been tried were Elai, Mugi, Guje, Kumragair, Kataribhog and Tulapanji.

Potatoes.—I had 240 plots of potatoes last year. It has been definitely proved that the Darjeeling variety of potato is the best for the cultivators. In the district of Bogra the Darjeeling potatoes have been very successful, and there is a great demand for the seeds. From the experiences of the past two years it has been found that the Darjeeling variety grows very well in the Pabna district and especially on the Bharenga side.

Distribution of plots.

Rajshahi	...	...	68
Bharenga	...	...	97
Bogra	...	...	76
Malda	...	...	6
Sara	...	...	9
Jaypurhat	...	...	7
Dinajpur	...	...	33
Jalpaiguri	...	...	11
Nator	...	...	6
			313

The approximate yield of potatoes is 75—100 maunds per bigha in Bogra, 50—65 in Rajshahi, 48—69 in Nator, 60—75 in Bharenga, 45—65 in Dinajpur and 60—70 in Jalpaiguri (all maunds per bigha). The manure used is generally cowdung supplemented by some oilcake. In 62 of the above plots green manuring with cowpea was taken recourse to. Of the remaining plots, some were either sown with *aus paddy* before the potatoes and some with jute. It is needless to say that the plots sown with cowpea first and potatoes after gave a higher yield.

Green manuring.—Cowpea with potatoes gave a very encouraging result. There were 36 plots green manured with *dhaincha* and then sown with *aman* paddy. Of these 29 gave very good results. There were three plots green manured with sunhemp and then sown with jute. Owing to the abnormal circumstances last year the results could not be obtained satisfactorily, but one of them at least leaves no doubt about its beneficial effects.

Manure pits.—The number of pits has been reduced during the year 1914, the total number being 71. In a few pits a new feature was introduced, namely, the addition of a small quantity of bonemeal to each day's collection, the idea being that the bonemeal would decompose along with the dung. This was done by the owners themselves, there being no extra labour for us.

Sugarcane.—Owing to the shortage of cuttings very few plots were under this crop. The Dacca Gandari, Shyamsara and Vendamukhi were tried. The Vendamukhi (called Velnamukhi in Rajshahi and adjoining districts) variety seems to be superior to the other two, and I generally recommended this variety. Cuttings of this variety are easily available in the division and that is another advantage. The Vendamukhi variety can stand drought better than the other two and also gives a superior quality and yield of *gur*. The Tanna canes are in great demand owing to its hardness which resists the attacks of wild boars.

Seed selection.—Last year was a disastrous year for the jute crop and hence not many cultivators could be induced to select the seeds specially. There were a lot of uncut plots, and the cultivators generally depended on them for seed. This year about 2 maunds of Mr. Finlow's jute is being tried side by side with the best cultivators' varieties, and in a few cases with our selected seeds.

Onions.—During the year 1914-15, I introduced the cultivation of *deshi* and Patna onions among many cultivators. The crop seems to be an extremely profitable one, in some cases even more profitable than potatoes. It is a very easily cultivated crop and the seeds are available anywhere. The *deshi* variety is more profitable than the Patna. In a few cases the yield has been from 80—100 maunds per bigha.

Horticulture.—During this year some attention was given to this branch of our work. In some villages near Rajshahi seed-beds were opened and the process of raising seedling was shown to the cultivators. Cabbages, cauliflowers, turnips, carrots, etc., were sown by some cultivators and the profit made by them is sure to attract many more in future.

Cattle food.—The question of fodder crops received more attention this year than in previous years. There were altogether 43 plots of land sown under my supervision with various sorts of fodder crops. There were 7 plots of *kheshari*, 16 of cowpea, 9 of *juar*, 5 of *gahama*, 4 of *matikalai* and 2 of Patna carrots. The two fields of carrots gave a yield of about 125 maunds of green food per bigha on an average. Guineagrass, Reana and *khari* cane are being tested.

Implements.—The Planet Junior Hand Hoe, the Meston Plough and the Done have been introduced in many places. Demonstrations on the uses of these implements were conducted throughout the division. Demonstrations on the use of the Knapsack Sprayer were also arranged.

N. GUPTA,
Supdt. of Agriculture, Rajshahi Division.

RAJSHAHI,
The 28th June 1915.

BONEMEAL (PADDY).

District and name of cultivator.	Area of land each both manured and unmanured.	Yield.		Difference.	Difference per bigha.	Price of difference at Rs. 2-8 per maund.
		Unmanured.	Manured.			
RAJSHAHI.	B. K.	Mds. Sr.	Mds. Sr.	Mds. Sr.	Mds. Sr. Ch.	Rs. A. P.
Purna Chandra Sarkar.	1 0	9 12	11 3	1 31	1 31 0	4 7 0
Bhubon Mohan Maitra.	0 15	3 6	4 10	1 4	1 8 0	3 0 0
Sheru Sardar ...	1 5	7 2	8 12	1 10	1 0 0	2 8 0
Pachu Ram Sarkar...	1 0	6 10	6 29	0 19	0 19 0	1 3 0
Pariqulla ...	1 3	7 2	8 30	1 28	1 19 0	3 11 0
Hamid Mondal ...	0 16	4 0	5 0	1 0	1 10 0	3 2 0
Meghu Sarkar ...	0 10	3 13	4 9	0 36	1 32 0	4 8 0
Khudi Mirdha ...	1 0	8 5	9 10	1 5	1 5 0	2 13 0
Kinu Mirdha ...	1 2	7 10	7 38	0 28	0 25 0	1 9 0
Esmail Mondal ...	0 18	7 3	7 24	0 21	0 23 5	1 7 3
Ebrahim Mondal ...	3 10	26 5	32 0	5 35	1 27 0	4 3 0
Amanat Sheikh ...	1 15	5 12	7 5	1 33	1 1 0	2 9 0
Dobir Mia ...	0 12	4 2	5 5	1 3	1 32 0	4 8 0
Karamali Jotedar ...	1 0	6 5	7 13	1 8	1 8 0	3 0 0
Naba Pramanick ...	1 0	3 13	5 22	2 9	2 9 0	5 9 0
BOGRA.						
Pachkari Sahi ...	3 6	...	32 4	...	...	...
	2 10	...	16 22	...	...	...
	1 0	7 5	9 5	2 0	2 0 0	5 0 0
	0 12	4 0	4 36	0 36	1 20 0	3 12 0
	0 15	3 15	3 22	0 7	0 9 0	0 9 0
	2 5	...	16 1	...	...	...
	2 0	19 6	22 15	3 9	1 24 8	4 0 6
	1 0	7 5	9 10	2 5	2 5 0	5 5 0
KHANJANPUR. (BOGRA).						
Ward's Estates ...	0 13	4 10	6 3	1 33	2 9 4	5 9 3
	1 0	7 15	9 5	1 30	1 30 0	4 6 0
	1 5	6 10	6 30	0 20	0 16 0	1 0 0
	0 10	3 15	4 13	0 38	0 19 0	1 3 0
	0 6	2 10	3 15	1 5	3 30 0	9 6 0
Pitambar Raha ...	1 0	7 5	8 10	1 5	1 5 0	2 13 0
Joy Krishna Pal ...	1 5	6 10	8 15	2 5	1 28 0	4 4 0
Erfanali Mia ...	0 10	3 15	4 20	1 5	0 22 8	1 6 6
Jabbar Seikh ...	0 10	4 0	6 0	2 0	1 0 0	2 8 0
Torabali ...	1 5	13 0	14 10	1 10	1 0 0	2 8 0
JALPAIGURI.						
	1 0	No Check Plot.	10 13	...	...	...
	0 15		9 3	...	...	...
	3 0		32 3	...	...	...
	2 1		14 8	...	...	...
	0 12		4 0	...	...	...
	1 5		7 25	...	...	...

District and name of cultivator.	Area of land each both manured and unmanured.	Yield.		Difference.	Difference per bigha.	Price of difference at Rs. 2-8 per maund.
		Unmanured.	Manured.			
PABNA.	B. K.	Mds. Sr.	Mds. Sr.	Mds. Sr.	Mds. Sr. Ch.	Rs. A. P.
Tangbari ...	1 0	8 5	9 10	1 5	1 5 0	2 13 0
Baktarpur ...	1 0	7 30	9 0	1 10	1 10 0	3 2 0
Sara	0 12	4 5	6 0	1 35	3 5 0	7 13 0
	1 0	9 0	10 30	1 30	1 30 0	4 6 0
	0 15	6 3	7 12	1 9	1 25 5	4 1 3
DINAJPUR.						
Golam Ali ...	2 0	15 10	18 30	3 20	1 30 0	4 6 0
Barkatulla Sekh ...	1 10	13 0	15 2	2 2	1 14 9	3 6 6
Hem Chandra Sil ...	2 10	19 10	23 0	3 30	1 20 0	3 12 0
Dhone Krishna Bairagi.	0 15	4 30	6 9	1 19	1 38 11	4 14 9

BONEMEAL WITH JUTE.

No.	Name of village.	Outturn per bigha.	Value of outturn per bigha.	Expenditure per bigha.	Profit.	Net profit in manured.	
		Mds. Sr.	Rs.	Rs. A.	Rs. A.	Rs.	
1	Tangbari...	7 20	30	17 8	12 8	4	Manured.
		5 30	23	14 8	8 8		Unmanured.
		7 0	28	18 8	9 8	3 Profit	Manured.
		5 20	22	15 8	6 8		Unmanured.
2	Baktarpur	7 20	30	14 0	16 0	3	Manured.
		6 0	24	11 0	13 0		Unmanured.

POTATOES (DARJEELING).

RAJSHAHI.	Outturn per bigha.	Value of outturn.	Approximate cost.	Net profit.
	MDS. SR.	RS. A.	RS. A.	RS. A.
Paba	43 0	86 0	42 10	43 6
	59 10	18 8	41 0	77 8
	51 6	102 5	56 8	46 13
Nahata	61 0	122 0	51 12	70 4
	46 10	92 8	56 0	36 8
Baya	61 0	122 0	47 0	75 0
	39 6	78 5	51 0	27 5
Tanore	45 3	90 2	50 0	40 2
	53 0	106 0	43 14	63 14
Godagari	38 10	76 8	49 0	27 8
	43 0	86 0	36 10	49 6
Shahapur	71 0	142 0	38 0	104 0
	55 16	110 13	49 8	70 5
Puthia	37 10	74 8	60 0	14 8
Nator	74 12	148 10	36 0	112 10
	49 10	98 8	45 0	53 8
	43 0	86 0	57 0	29 0
	54 10	108 8	51 10	56 14
	68 13	136 10	49 12	96 14

POTATOES (DARJEELING).

PABNA.	No.	Outturn per bigha.	Value of outturn.	Expenditure per bigha.	Net profit.
		Mds. Sr. Ch.	Rs. A.	Mds. Sr.	Rs. A. P.
Majbari ...	1	58 0 0	145 13	42 0	103 0 0
	2	45 20 0	111 12	39 8	74 4 0
Kapashdanga ..	3	35 0 0	87 8	34 0	53 8 0
Mayabari ...	4	40 0 0	100 0	42 0	58 0 0
	5	53 0 0	132 8	52 8	80 0 0
Chandipur	6	82 16 0	106 0	35 0	71 0 0
Maidanagar ...	7	68 26 0	171 0	52 0	119 0 0
Mirpur ...	8	41 17 8	103 9	39 1	64 8 6
	9	45 20 0	113 12	45 0	68 12 0
	10	50 0 0	124 0	40 0	84 0 0
Dighalkandi	11	57 8 0	143 0	44 0	99 0 0
	12	61 0 0	152 8	52 8	100 0 0
	13	52 20 0	129 4	57 8	61 12 0
Baktiarpur ...	14	42 0 0	105 0	33 0	72 0 0
	15	52 16 0	131 12	48 0	83 0 0
	16	69 0 0	138 0	52 0	86 0 0
Bagchar	17	73 0 0	156 0	43 0	113 0 0
Bharenga ...	18	68 10 0	137 0	41 8	95 8 0
	19	71 0 0	142 0	39 0	103 0 0

POTATOES (DARJEELING).

Bogra.	No.	Outturn per bigha.	Value of outturn at Rs. 2-4 per maund.	Expenditure including price of seeds.	Net profit.
		Md. Sr. Ch.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Dhara	20	93 0 0	209 4 0	73 0 0	136 4 0
	21	76 3 0	171 1 0	67 0 0	103 15 0
	22	83 0 0	186 12 0	50 0 0	136 12 0
	23	85 10 0	191 13 0	52 10 0	139 3 0
	24	61 0 0	137 4 0	47 3 0	90 1 0
	25	49 0 0	110 4 0	59 0 0	51 4 0
	26	71 0 0	159 12 0	75 0 0	84 12 0
	27	75 0 0	168 12 0	61 0 0	107 12 0
	28	69 0 0	155 4 0	72 0 0	83 4 0
	29	83 10 0	187 5 0	61 0 0	125 11 0
	30	91 0 0	204 8 0	78 0 0	126 8 0
	31	87 10 0	195 12 0	81 0 0	114 12 0
	32	64 0 0	144 0 0	39 10 0	104 6 0
	33	49 0 0	110 4 0	48 0 0	62 4 0
Khanjanpur ...	34	56 0 0	126 0 0	42 0 0	84 0 0
	35	62 0 0	139 8 0	40 0 0	99 8 0
	36	61 20 0	138 6 0	41 10 0	96 12 0
	37	79 0 0	177 12 0	62 0 0	115 12 0
Hili	38	82 10 0	185 1 0	65 0 0	120 1 0
	39	63 0 0	141 12 0	73 10 0	68 2 0

SUGARCANE.

VENDAMUKHI *vs.* KHARI *vs.* SHAMSARA.

District.		Outturn of *gur* per bigha (Khari).	Outturn of *gur* per bigha (Vendamukhi).	Outturn of *gur* per bigha (Shamsara).	Outturn of *gur* per bigha (Gandari).
		Mds. sr.	Mds. sr.	Mds. sr.	Mds. sr.
Rajshahi ...	1 ...	18 10	...	...	24 20
	2 ...	14 0	24 6	...	...
	3 ...	22 0	30 10	23 16	...
	4 ...	20 10	27 0	...	...
	5 ...	21 0	...	26 0	...
Khanjanpur ...	6 ...	13 10	32 0	...	25 20
	7 ...	17 10	...	21 0	...
	8 ...	20 0	26 13	23 10	25 0
Dinajpur ...	9 ...	19 0	27 30	...	...
	10 ...	13 0	31 0	...	...

GREEN MANURING—(AMAN PADDY WITH DHAINCHA).

	Area both manured and unmanured.	Outturn unmanured.	Outturn manured.	Difference.	Difference per bigha.	Value of difference at Rs. 2-8 per maund.
	B. K.	MDS. SR.	MDS. SR.	MDS. SR.	MDS. SR. CH.	RS. A.
Rajshahi ...	0 15	6 10	7 5	0 35	1 8 0	3 0
	1 0	8 0	9 10	1 10	1 10 0	3 2
	1 0	5 12	6 0	1 12	1 12 0	3 4
	1 0	9 10	9 26	0 16	0 16 0	1 0
	0 12	4 5	4 22	0 17	0 30 0	1 14
Bogra	1 4	10 0	11 5	1 5	1 0 4	2 9
	0 15	6 0	7 13	1 13	1 30 0	4 6
	1 0	7 15	8 6	0 31	0 31 0	1 15
Dinajpur ...	1 10	7 3	8 13	1 10	1 0 0	2 8
	0 10	3 8	4 4	0 36	1 32 0	4 8

The cost of green manuring is practically nothing. Say 2 annas per bigha in seeds. Both the plot received a small but equal quantity of cowdung.

DEMONSTRATIONS IN ONIONS.

District and name of cultivator.	Amount of seed.	Area.	Outturn.	Outturn per bigha approximately.	Price per bigha.	Cost per bigha approximate.	Profit.
RAJSHAHI.	MDS. SR.	B. K.	MDS. SR.	MDS. SR.	RS. A.		RS. A.
Kushi Atpohari	6 0	2 0	130 0	65 0	162 8	About Rs. 32-8 per bigha.	130 0
Rash Behari ...	1 0	0 8	9 0	21 0	52 8		20 0
Maffez Sheikh ...	5 0	1 12	56 0	36 0	90 0		58 8
Meghu Sarkar ...	3 0	1 0	62 0	62 0	155 0		122 8
Esmail Mondal	2 0	0 16	49 0	61 0	152 8		120 0
Mohar Sarker ...	0 10	0 2	4 0	40 0	100 0		77 8
Dorab Mondal ...	1 0	0 10	31 0	61 0	152 8		120 0
Sakir Monna ...	3 0	1 0	63 0	63 0	157 8		125 0
Naser Seikh ...	4 0	1 10	59 20	40 0	100 0		77 8

Manure used—2 maunds of castor cake per bigha and a small amount of cowdung.

	Rs.	A.
Expenditure (approximate)—		
3 maunds seeds at Rs. 3 per maund ...	9	0
2 maunds castor cake at Rs. 2-8 per maund ...	5	0
Cowdung	0	8
Labour	10	0
Irrigation	8	0
Total ...	32	8

N. GUPTA,

Superintendent of Agriculture, Rajshahi Division.

ANNUAL REPORT OF THE DEMONSTRATION WORKS IN THE DISTRICT OF RANGPUR FOR THE YEAR 1914-15.

BABU B. L. MUKHERJI was in charge of the demonstrations in the district up to the 20th April 1915. Babu J. K. Biswas took over charge on the 21st in addition to other duties. The demonstrations of the year under report were therefore mainly carried out by Benode Babu. Babus Benode Lal Mukherji and Jamini Kumar Biswas between them spent 175 days on tour. There were four demonstrators in this district up till May 1915, and three since then. The demonstrations were carried out mostly through the members of the Rangpur District Agricultural Association.

The demonstrations may be divided under the following heads :—

(1) Bonemeal.

(2) Introduction of hill potatoes.

(3) Ditto Meston ploughs, Planet Junior Handhoe and Hand Cultivators.

(4) Seed selection.

(5) Conservation of cattle dung.

(6) Growing of cowpea as greenmanure.

Bonemeal—

Quantity supplied.

Year.	Maunds.
1912-13	60
1913-14	70
1914-15	60

This year bonemeal was received on the 13th and 25th March 1915. Appendix I will show the result of the experiments on the effect of bonemeal for the first and second year.

The results do not show any marked advantage for bonemeal. As stated in last year's report, it succeeds only in a very few places of Rangpur. No new demonstration with bonemeal was started last year, and it was only supplied to a few raiyats on their own application.

Introduction of hill potatoes.—One hundred and fifty maunds of Darjeeling and Nainital potatoes were sold during the year to 267 men in 87 villages as

against 135 maunds last year. In 17 plots they were tested against country potatoes. Appendix II shows the result. Although the outturn of the hill potatoes is higher than that of the country potatoes, yet, on account of the better keeping quality of the latter, they are not so much in demand. They are, however, liked by people who can dispose of their produce quickly.

Introduction of improved implements.—Twenty Meston ploughs and 3 Handhoes were supplied to the raiyats as against 90 and 3, respectively, in the last year. In Hatibandha side of the Sadar Subdivision the raiyats seem to have got a liking for these implements, specially the plough, and orders have recently been received for more ploughs. The plough is very useful in light soil. Evidently the raiyats have seen the superiority of this plough to the local ploughs, but it does not work well in ploughing land for transplanting *aman* paddy. Considering the vast area under paddy land in Bengal it will be a decided improvement if an improved plough can be introduced which will suit the purpose. The Handhoe seems to be very good for interculture of tobacco, potato and sugarcane. The demand for it may gradually increase, as Rangpur is a big tobacco-growing district.

In many places difficulty is experienced in irrigating tobacco, although it is known to be profitable. The main difficulty, specially where the water-level is low, is the want of a suitable implement. A chain pump was obtained by the Court of Wards Estate and set up in Lalmonirhat. It worked quite well and was greatly liked by the people. But within a few days of its being set up there was a shower of rain, and its further use rendered unnecessary. It will be given a thorough trial next season. If it proves successful, there is likely to be a great demand as the people thoroughly realise the importance of irrigation for tobacco. There is no doubt that a much larger number of Meston ploughs and Handhoes would have been taken by the raiyats but for the war. The raiyats of Rangpur whose principal sources of income are jute and tobacco have been very hard hit, and have saved little to invest in new things.

Seed selection.—Jute seeds selected from the plants of 1913 were sown in 5 plots along with check plots. The results, as will be seen from Appendix III, appear to be encouraging. This method will have to be continued so as to be able to arrive at a definite conclusion. Selected seeds of special varieties have been obtained from the Fibre Expert and have been sown alongside with ordinary seeds.

Badshabhog paddy was supplied to eight men to compare with the local paddy. The result will be seen from Appendix IV. The results seem to be good.

Conservation of cattle dung.— Forty-five men erected simple temporary sheds to conserve the cattle dung and household refuse as against 120 men last year. Most of these sheds fell down long ago.

The best crop for green manuring so far appears to be cowpea.

Fodder crops.—Joar has been found both at the demonstration and dairy farm a very useful fodder crop. With a view to popularise its cultivation, 1 maund and 25 seers of seeds have been distributed free among selected cultivators.

Programme of work for 1915-16.—In addition to the items mentioned in last year's report, it is hoped to take up the introduction of Sumatra tobacco. This will depend somewhat on the result obtained from this year's crop and will be started on a small scale. It is also expected to distribute a much larger quantity of the Fibre Expert's improved jute seeds.

J. N. CHAKRAVARTY.

Forwarded.

The results appended are unreliable. I informed you that the District Agricultural Officer kept no records of the plots which gave negative results. Corrections by me.

K. MCLEAN.

The 3rd July 1915.

APPENDIX I.

BONEMEAL—1ST YEAR.

Name and locality.	Treatment.	Area in acres.	Actual outturn.	Outturn per acre.	Remarks
			Mds. srs. ch.	Mds. srs. ch.	
Babu Ambika Charan Mittra, of Bongram.	Manured ...	·479	1 0 0	2 3 3	Jute.
	Unmanured ...	·413	0 30 0	1 32 9	
Babu Rajendra Kumar Sarker, of Kulaghat.	Manured ...	·281	2 10 0	7 37 10	Do.
	Unmanured ...	·397	2 11 0	7 25 8	
Babu Daliram Sarker, of Gogra	Manured ...	·322	1 17 0	5 32 14	Paddy.
	Unmanured ...	·644	2 25 0	4 3 5	
Babu Harendra Narayan Sarker, of Gogra.	Manured ...	·132	1 7 0	8 35 7	Jute.
	Unmanured ...	·157	1 0 0	6 14 1	
Ditto ditto	Manured ...	·099	0 33 0	9 3 0	Do.
	Unmanured ...	·099	0 26 0	7 4 5	
Ditto ditto	Manured ...	·132	0 34 0	6 26 3	Do.
	Unmanured ...	·132	0 22 8	4 9 6	
Sariat Khan, of Sindurna ...	Manured ...	1·281	16 15 0	12 34 3	Do.
	Unmanured ...	·628	2 32 0	6 2 0	
Ditto ditto ...	Manured ...	·057	0 14 0	6 2 0	Paddy.
	Unmanured ...	·099	0 26 0	6 20 2	
Babu Prasanna Kumar Pandit, of Gogra.	Manured ...	·107	2 25 0	24 8 0	Do.
	Unmanured ...	·107	2 10 0	20 39 7	
Md. Shahiruddin, of Tushbander	Manured ...	·148	1 35 0	12 22 2	Do.
	Unmanured ...	·231	1 22 0	6 26 3	
Babu Paramananda Das, of Ballamighar.	Manured ...	·115	3 0 0	25 7 5	Do.
	Unmanured ...	·165	4 5 0	22 12 6	
Babu Jadab Chandra Ghose, of Mohimaganj	Manured ...	·165	4 6 8	25 7 5	Do.
	Unmanured ...	·165	3 35 0	23 17 12	
Babu Basanta Kumar Bakshi, of Damoderpur.	Manured ...	·248	3 15 0	13 24 8	Do.
	Unmanured ...	·330	4 0 0	12 4 0	
Babu Girija Prosad Nag, of Damoderpur.	Manured ...	·215	5 34 0	27 9 0	Do.
	Unmanured ...	·330	8 8 0	24 32 3	
Babu Surendra Nath Chowdhury, of Damoderpur.	Manured ...	·496	9 0 0	18 6 0	Do.
	Unmanured ...	·330	5 30 0	17 15 12	
Md. Ainulla Sheikh, of Damoderpur.	Manured ...	·3	3 6 0	10 23 8	Do.
	Unmanured ...	·330	3 13 0	10 2 5	
Md. Dukhu Shekh, of Badiakhali.	Manured ...	·2	4 8 0	21 7 0	Do.
	Unmanured ...	·2	3 24 0	18 6 0	
Babu Mukunda Ch. Roy, of Asadpur.	Manured ...	·330	0 20 0	1 20 8	Mustard.
	Unmanured ...	·165	0 5 0	0 30 4	
Md. Motiullah, of Nizpera ...	Manured ...	·214	1 5 0	5 11 12	Jute.
	Unmanured ...	·2	1 0 0	4 33 5	
Nazamuddin Sarker, of Haribhanga.	Manured ...	·036	0 14 0	19 26 8	Paddy.
	Unmanured ...	·065	0 12 10	9 33 4	
Md. Muchi Mali, of Nizpera ...	Manured ...	·157	1 20 0	9 21 2	Do.
	Unmanured ...	·090	1 5 0	6 32 4	
Md. Chakmal Khan, of Sindurna	Manured ...	·843	8 10 0	9 30 3	Jute.
	Unmanured ...	·3	1 10 0	4 6 6	
Md. Muchi Mali, of Nizpera ...	Manured ...	·148	1 20 0	9 21 2	Paddy.
	Unmanured ...	·090	1 5 0	6 32 4	
,, Sayeduddin, of Nizpera ...	Manured ...	·330	2 11 0	6 35 4	Do.
	Unmanured ...	·347	2 11 4	6 32 4	
Ditto ditto ...	Manured ...	·330	7 20 0	22 27 8	Do.
	Unmanured ...	·347	6 0 0	17 0 10	

APPENDIX II.

POTATO.

Name and locality.	Treatment.	Area in acres.	Total outturn.	Outturn per acre.	REMARKS.
			MDS. SRS. CH.	MDS. SRS. CH.	
Md. Kachimuddin, Panchayet of Khatkhatia.	Darjeeling ...	·190	31 12 8	164 19 6	
	Country ...	·181	24 0 0	131 38 10	
Md. Aseruddin Daftry, of Chabbishhajari.	Darjeeling ...	·235	33 12 0	141 16 12	
	Country ...	·280	20 25 0	73 2 4	
Md. Ajitulla, of Basirhat ...	Darjeeling ...	·048	4 0 0	92 1 8	
	Country ...	·092	8 0 0	86 8 8	
Bhola Nath Das, of Nizpara ...	Darjeeling ...	·042	7 12 8	195 34 12	
	Country ...	·022	2 27 0	98 31 10	
Babu Promotho Bhushan Mukharji, of Tushbhander.	Darjeeling ...	·247	13 5 0	85 3 5	
	Country ...	·214	15 0 0	77 8 4	
Babu Prasanna Kumar Pandit, of Gogra.	Darjeeling ...	·020	3 10 0	230 38 5	
	Country ...	·083	9 28 0	126 32 14	
Daliram Sarkar, of Gogra ...	Darjeeling ...	·028	3 30 0	129 18 12	
	Country ...	·028	2 32 0	96 32 0	
Mahatazuddin, of Tongbhanga	Darjeeling ...	·043	7 30 0	163 1 5	
	Country ...	·096	8 5 0	84 21 15	
Babu Ramananda Sanjval, of Naodabash.	Darjeeling ...	·074	17 35 0	254 4 0	
	Country ...	·024	3 19 0	140 15 5	
Sadar Mia, of Kaliganj ...	Darjeeling ...	·062	7 5 0	110 39 4	
	Country ...	·062	7 30 0	74 4 8	
Md. Chakmal Khan, of Sindurna.	Darjeeling ...	·024	6 36 0	278 12 0	
	Country ...	·227	14 29 0	160 3 14	
Md. Sariatkhan, of Sindurna ...	Darjeeling ...	·028	4 35 0	168 19 11	
	Country ...	·028	3 30 0	129 24 13	
Babu Guru Prasad Sarkar, of Bijgram.	Darjeeling ...	·108	13 20 0	124 1 0	
	Country ...	·198	8 6 0	41 2 9	
Babu Promotho Nath Banarji, of Fulchari.	Darjeeling ...	·148	12 30 0	84 28 0	
	Country ...	·033	1 20 0	45 1 8	
Babu Rajchandra Das, of Fulchari.	Darjeeling ...	·281	36 4 0	126 22 0	
	Country ...	·082	11 10 0	60 39 10	
Md. Shaharulla Mustafi, of Mianpara.	Darjeeling ...	·041	14 10 0	153 8 10	
	Country ...	·149	21 11 0	144 8 10	

APPENDIX III.

JUTE.

Name and locality.	Treatment.	Area in acres.	Actual outturn.	Outturn per acre.	REMARKS.
			MDS. SRS. CH.	MDS SRS. CH.	
Sadu Teli, of Tushbhander ...	Selected ...	·052	0 35 0	16 25 8	
	Ordinary ...	·108	1 5 0	10 20 7	
Babu Monoranjan Banerjee, of Tushbhander.	Selected ...	·181	1 0 0	5 17 12	
	Ordinary ...	·330	1 20 0	4 21 8	
Md. Shaharatulla, of Tushbhander.	Selected ...	·033	0 34 0	19 26 8	
	Ordinary ...	·082	1 5 0	13 24 8	
Md. Nur Bux Shekh, of Hatibandha.	Selected ...	·099	0 32 0	8 27 14	
	Ordinary ...	·099	0 25 0	6 32 4	
Md. Amanatullah, of Hatibandha.	Selected ...	·016	0 9 0	13 24 8	
	Ordinary ...	·016	0 7 0	10 23 8	

APPENDIX IV.

BADSHABHOG PADDY.

Name and locality.	Treatment.	Area in acres.	Actual outturn.	Outturn per acre.	REMARKS.
			MDS. SRS. CH.	MDS. SRS. CH.	
Babu Biswambhar Das, of Nizpera.	Badshabhog ...	·115	1 18 0	12 19 2	
	Tulpakri ...	·115	1 15 0	11 31 14	
Namaruddin, of Hatibandha ...	Badshabhog ...	·040	0 15 0	36 12 0	
	Tulpakri ...	·137	1 29 0	27 27 2	
Samiruddin Shaikh, of Tushbhander.	Badshabhog ...	·69	0 20 0	7 10 6	
	Rasulbhog ...	·069	0 16 0	5 34 7	
Babu Bidhu Bhusan Barman, of Hatibandha.	Badshabhog ...	·006	0 6 0	24 8 0	
	Malsira ...	·006	0 3 0	19 26 8	
Basu Shaikh, of Tushbhander ...	Badshabhog ...	·045	0 7 0	3 38 13	
	Malsira ...	·628	1 28 0	1 36 10	
Babu Basanta Kumar Barman, of Hatibandha.	Badshabhog ...	·044	0 35 0	19 26 8	
	Binnafal ...	·148	2 10 0	15 5 0	
Nabin Chander Patwari, of Lalmanirhat.	Badshabhog ...	·120	1 20 0	13 24 8	
	Tulpakri ...	·082	1 3 0	13 0 4	
Baharuddin Mocter, of Kurigram	Badshabhog ...	·082	2 36 4	35 6 10	
	Khirshabhog ...	·053	1 6 4	21 7 0	

J. N. CHAKRAVARTI,
Supdt. of Agriculture, Rangpur.

ANNUAL REPORT OF THE DEMONSTRATION WORK OF THE SUPERINTENDENT OF AGRICULTURE, CHITTAGONG DIVISION.

No. 969, dated Chittagong, the 5th July 1915.

From—D. DATTA, ESQ., B.SC., M.S.A., Superintendent of Agriculture, Chittagong Division,.

To—The Director of Agriculture, Bengal, Calcutta.

(Through the Deputy Director of Agriculture, Bengal, Dacca.)

WITH reference to your letter No. 3743-48, dated the 3rd May 1915, I have the honour to submit herewith my annual report for the year ending the 30th June 1915.

The usual demonstrations recommended by the Department were carried on in the districts under my charge. The first and most important of which, namely, the introduction of manure for paddy, has been attended with various success as the report in the Appendices I and I(*b*) will show.

Bonemeal was applied on 59 plots for paddy and 13 plots for jute, totalling 72 plots in all. No bonemeal experiment was tried at Chandpur for this year, and neither any experiment was conducted at Comilla owing to the transfer of Demonstrator Tandal Singh nor was the manure brought by Nawab Sayed Hossam Hyder Chaudhuri and the Tippera Raj utilized.

From the perusal of the results submitted in Appendices I and I(*b*), it will be easily seen that bonemeal cannot be used as a panacea for the enrichment of our soils. The greatest and the most uniform success has been achieved in the light and recent alluvial soils of Noakhali Sadar, where the average profit has been Rs. 12-3 per acre. Out of 19 plots there, only four plots average Rs. 2-12-6. The small profit in these plots was due to negligence on the part of the cultivators (late manuring and late transplantation), and, if these are left out of consideration, the average for Noakhali increases to Rs. 14 per acre. In and around Harinarayanpur and Noakhali saltpetre was used by 5 persons, who though are satisfied with apparently better crops, but the average profit was only Rs. 14-6. All these 5 persons are now firm believers of better result in the use of bonemeal mixed with saltpetre though the actual money value was not greater in this year's experiment. If we could really add some cheap nitrogenous manure with bonemeal to the similar soils, the crops would not only be heavier, but the profits would also swell proportionately. It seems to me necessary to investigate in this line.

In Brahmanbaria bonemeal was applied in 24 plots; of these 10 did not yield any profit at all. On the remainder 14, jute was grown and a small average profit of Rs. 9 per acre was secured. As regards the *aman* paddy to which the bonemeal was applied last year, it may be said that there was a great drought during the latter part of the season, and though the plants in the manured plots were more vigorous than those of the unmanured, a very slight difference was apparent in the actual yield of grains. Some of the last year's plots are, however, showing some residual effects this year.

In Chittagong, seven plots were tried and profit varied from Re. 1-8 to Rs. 24 per acre. The plots are not sufficiently numerous to warrant any average figure and the demonstration evidently shows the spartine behaviour of bonemeal in Chittagong soil. The Chittagong soil is not very uniform and no extensive trials have so far been made.

Last year an attempt was made to use bonemeal at Feni in the expectation of sufficient hands to carry on the demonstration started. But as none was available, the result has been very disappointing. It is, however, to be hoped that, with the new demonstrator, some success might be achieved.

With the exception of Chittagong and Brahmanbaria where the number of manurial plots are handy and where the people are also more educated and more intelligent, I could not persuade the cultivators of the other subdivisions to keep a regular account of their demonstration plots and neither was it necessary for Noakhali where demonstration has already proved successful beyond measure. The residual effects of the manure are given in Appendix I(*b*). Out of six plots in Chittagong one just paid the cost of manure in the second year, and another paid a profit of Rs. 2-4 only. The remaining four plots have shown an average profit of Rs. 16-14 nearly per acre in two years, or Rs. 8-7 per annum. At Brahmanbaria out of

9 plots two are still in a deficit of Rs. 4 and Rs. 7. Three plots show an increase of Rs. 7 to Rs. 9, or an average of Rs. 8-5, and in the other four a profit varying from Rs. 13 to Rs. 29 per acre was secured for the two consecutive years.

Seed selection.—The method of seed selection as was pursued last year has been continued. The comparison of selected and non-selected *aus* paddy in the last agricultural year, *i.e.*, in 1321 B.S. was published in the last annual report. The whole *aus* crop of Brahmanbaria has been entirely destroyed this year, and hence the entire work of seed selection is to be begun afresh from the next agricultural year. The *aus* crop of Chandpur has not as yet been harvested; so the second year's results about the outturn of the selected seeds cannot be incorporated in this report. Appendix II will show the yield of the selected jute seeds versus ordinary seeds sown by cultivators. In Noakhali Sadar there have been 11 plots and the average increase works out to be 4-13 maunds per acre in favour of the selected seeds. In Chandpur an increase of 1-4 mds. and in Brahmanbaria of about 3 maunds per acre has been noticed. In Noakhali, however, people have not grown jute much this year, and every one of them has discarded his own seeds in favour of the selected seeds and has adopted our method of selection. In Brahmanbaria jute grown from the second year's selected seeds has also been destroyed by flood. It will be very difficult to get any seed for the next year's crop.

Introduction of new crop.—An attempt was made for the introduction of superior varieties of sugarcane cutting in the sugarcane regions of my division, but owing to the dearth of cuttings in the Dacca Farm the work did not proceed further. There are many centres where sugarcane is already grown and the cultivation may be further extended. Thana Sitakunda, Mirsarai, Satkania, Raizan of Chittagong, Parasuram and Sagalnia of Feni, Chaudhagram and Chandina of Comilla Sadar are the places where better varieties of sugarcane may be very successfully introduced.

Potatoes.—Potatoes were distributed amongst the cultivators of various subdivisions as under:—

Brahmanbaria ...	6	mds. (Darjeeling varieties).
	1½	„ (Nainital ditto).
Chandpur ...	30	„ (Darjeeling).
	70	„ (Nainital).
Comilla .	23	„ (Darjeeling).
	12	„ (Nainital).
Noakhali ...	20	„ (Darjeeling).
	20	„ (Nainital).
Chittagong ...	14	„ (Darjeeling).
	6	„ (Nainital).

The results of the demonstrations are in Appendix III. The demonstration was most successful in Noakhali where the average outturn was 177 maunds per acre for Darjeeling potatoes with a mean profit of Rs. 374 per acre (calculating the price of new potatoes at Rs. 3 and seed potatoes at Rs. 10). This mean profit does not take into consideration the cost of labour and manure, for which none of the cultivators paid. Ambika Charan Mukhtar bought some manure, and his profit has also been above the others. In Noakhali potato was grown after *aus* and it did well even without manure. The very low yield of 50 to 60 maunds of Darjeeling potatoes per acre was obtained from the very tiny tubers which were found in some of the bags sent from Darjeeling. In this connection I cannot but mention the names of Ambika Charan Mukhtar and Parbati Charan Kabiraj, both of whom took the keenest interest in our potato demonstration. The former gentleman deserves special mention for the way in which he conducted various small experiments to satisfy himself as to the effects of manure, irrigation and size of seed potatoes. Happily there was no outbreak of any disease in any of these plots. A potato exhibition was held to encourage the local cultivators, and it was very well attended. Prizes to the value of Rs. 150 have been awarded. A purely agricultural co-operative society for the purchase of seed potatoes and agricultural implements will greatly help the cultivators of this region. From the interest of the people in the last Potato Exhibition we could safely say that 500 maunds of potatoes even would be a mere drop in the ocean to meet the demands of the people of the locality. It has been seen that irrigation might largely increase the outturn obtained, and for this a few chain pumps of 12-foot draft would be necessary. The question of

advancing these sums to the cultivators looms as an important factor in the extension of potato cultivation. Should there be more direct co-operation between the Co-operative Department and ours, such difficulties would be very easy to solve, and I, for myself, cannot believe that energies of the Co-operative Department could be misplaced if societies might be well organised for agricultural purposes rather than for paying old debts and thus spending the money in non-recuperative channels.

It has been seen this year all through my division that Darjeeling potato is a heavier yielder than Nainital. Last year's variety sent as Nainital gave a better outturn than this year's Nainital variety.

In Chittagong potato was tried in 34 plots. It is very sad to note that potatoes at Sanka Valley which is specially noted for it proved a very miserable failure owing to the very early rains which destroyed the potato sprouts entirely. The average outturn for Darjeeling has been 69 maunds per acre, neglecting the plots which suffered from excessive rain, disease and other uncontrollable factors. The yield of Nainital in Nasirabad might be increased greatly by proper irrigation.

In Comilla potatoes have been grown in regions where it was not tried before, and very small quantity of seeds was distributed and the low outturn in many cases is due to an utter want of knowledge about the habit of the crops and also to the novelty of the crop itself. Where the crop has been grown in moderate quantities and proper care has been taken, the outturn has been normal, viz., for Darjeeling we got 122 mds. per acre as an average and for Nainital in the best plots about 91 maunds. An outturn as high as 361 maunds and 268 maunds per acre has been obtained by Satish Chandra Sen of Srimanthapur and Elahi Baksh of Chandina, respectively.

In Brahmanbaria, too, very good crop was obtained at Urshiara and Mashawa, Ruposdi and Rasulabad, and the average outturn was 260 maunds for Darjeeling and 130 maunds for Nainital.

In Chandpur about 100 maunds of the potato seed was distributed. The potato is grown there in jute lands after the harvest of the jute crop. It seems that jute is a very exhausting crop, and the outturn of potato is decidedly poor, though the land to all outward appearance seems to be quite suitable for it. There were some 103 plots where potato was grown, and out of them there was a total loss of Rs. 32-8 per acre in 64 plots. The condition of the raiyats was, to a large extent, responsible for the loss sustained. Owing to the low price of jute which is the mainstay of the people in these regions, there is not a sufficiency of ready money to buy rice and they laid their hands on anything they could get at. It is remarkable to note that, though the bazar rate of potatoes was Rs. 2-12 to Rs. 3 per maund, the cultivators sold their crop at the low price of Re. 1-12 and some did not sell their crop at all but used it as their staple food. The people there apply all the available cowdung to jute lands, and do not preserve the cowdung retained in the rainy season as the cowsheds are built mostly in the lowest level of their homestead lands, and it is not an uncommon sight to see all the dung, etc., washed by the flood water. It is, therefore, proposed to try artificial manure next year on this char land, and to see the outturn that may be obtained out of the potato crop. In places where manure could be used the outturn was indeed very heavy, and the adaptability of the soil to the crop has been well justified. Likewise where potato has been grown after paddy, as in Chinamura, the outturn has been greater than the plots where potato was sown after jute, viz., about 102 and 140 maunds per acre.

DWIJA DAS DATTA,

Superintendent of Agriculture, Chittagong Division.

APPENDIX I.

Bonemeal Demonstration.

NOAKHALI.

Serial No.	NAME.	Village.	Length and breadth of the plot.	Yield of the plot per acre.	Yield of the check plot per acre.	Difference.	Money value of the difference.	Profit or loss per acre.	Name of the crop.
1	2	3	4	5	6	7	8	9	10
			CUBITS	MDS. SRS.	MDS. SRS.	MDS. SRS.	RS. A.	RS. A.	
1	Sarada Kumar Roy ...	Krishna Rampur	71 45	16 8	8 26	7 22	22 12	13 12 profit	Aman.
2	Kali Prasanna Acherji	Goalpur ...	80 40	28 22	19 10	9 12	28 0	19 0 ,,	Do.
3	Anour Ali	Mohodwir ...	64 50	18 16	12 30	5 16	16 2	7 2 ,,	Do.
4	Suna Mia	Fakirpur ...	80 40	16 26	12 5	4 21	13 2	4 2 ,,	Do.
5	Renu Mia	Chandrapur ...	88 36	27 17	16 13	11 4	33 4	28 4 ,,	Do.
6	Oali Mia	Maizdi	84 38	23 18	15 37	7 21	22 10	13 10 ,,	Do.
7	Dudas Mia	Chamrakhola ...	80 40	18 15	10 31	7 24	23 3	14 3 ,,	Do.
8	Kollash Karmakar ...	Akneshpur ...	68 47	21 8	13 37	7 11	21 13	12 13 ,,	Do.
9	Kali Maddi	Maizdi	80 40	22 29	15 39	6 30	20 4	11 4 ,,	Do.
10	Nur Mia	Do.	61 52	21 27	13 25	7 2	21 4	12 4 ,,	Do.
11	Khirod Chandra Mazumdar.	Uzalpur	88 36	25 39	14 10	11 29	35 2	26 2 ,,	Do.
12	Sadek Ali	Lakshmi Narayanpur.	100 32	18 6	13 25	4 19	13 6	4 6 ,,	Do.
13	Ali Mia	Ditto ...	64 50	15 35	10 25	5 10	5 12	6 12 ,,	Do.
14	Neajor Rahaman ...	Nityanandapur	64 50	22 25	13 10	9 15	28 2	19 2 ,,	Do.
15	Harmuz Kha	Maizdi	96 36	14 0	8 0	6 0	18 0	9 0 ,,	Do.
16	Kali Prasanna Pattya	Do.	80 40	15 35	9 25	6 10	18 12	9 12 ,,	Do.
17	Sasi Bhusan De ...	Alampur ...	57 56	13 26	10 23	3 3	9 4	0 4 ,,	Aus.
18	Azfar Ali	Darbeshpur ...	57 56	25 0	19 6	5 0	18 0	9 0 ,,	Do.
19	Sarat Chandra Das ...	Ditto ...	96 33	12 9	8 16	3 33	11 6	2 6 ,,	Do.

N.B.—Price of Bonemeal has been taken at Rs. 3 per maund or Rs. 9 per acre and that of Paddy at the market rate of Rs. 3 per maund.

Bonemeal and Saltpetre Demonstration.

			BIGHAS	MDS. SRS.	MDS. SRS.	MDS. SRS.	RS. A.	RS. A.	
1	Ambica Charan De ...	Gupta Auka ...	6	19 30	10 8	9 22	28 12	13 12 profit	Aman.
2	Tarini Charan Sarkar	Joykrishnapur...	3	20 31	10 5	10 32	32 8	17 8 ,,	Do.
3	Sarada Charan Bhomic	Ditto ...	1	19 20	10 20	9 0	27 0	12 0 ,,	Do.
4	Jogesh Chandra Chowdhury.	Alipur	1	16 30	.....	.....	.....	.....	Do.
5	Prasanna Kumar Pandit.	Chamrakhola ...	2	13 30	.....	.....	.....	.....	Do.

Bonemeal Demonstration.

CHITTAGONG.

			YDS.	MDS. SRS.	MDS. SRS.	MDS. SRS.	RS A.	RS. A.	
1	Gagan Chandra Dey ...	Betagi	16 34	26 28	22 9	3 19	10 8	1 8 Profit	Aus.
2	Shayama Charan De...	Bagaon	16½ 35	29 13	23 17	0 36	2 11	6 5 Loss	Do.
3	Rajani Kanta Bose ...	Ditto	12 30	25 8	21 7	4 1	12 1	3 1 Profit	Do.
4	Har Kishore Barua ...	Pahartali ...	45 30	40 31	9 23	11 7	33 7	24 7 ,,	Do.
5	Rakul Mussaddi ...	Ditto	20 40	30 10	24 8	6 2	18 2	9 2 ,,	Do.
6	Mahendra Lal Barua...	Ditto	19 40	27 30	23 3	3 28	11 0	2 0 ,,	Do.
7	Surendra Kumar Dey...	Bagoan	16 36	29 35	21 0	8 35	26 4	17 4 ,,	Do.

Bonemeal Demonstration.

SUBDIVISION—FENI.

Serial No.	NAME.	Village.	Length and breadth of the plot.	Yield of the plot per acre.	Yield of the check plot per acre.	Difference.	Money value of the difference.	Profit or loss per acre.	Name of the crop.
1	2	3	4	5	6	7	8	9	10
			B. K.	MDS. SRS.	MDS. SRS.	MDS. SRS.	RS. A.	RS. A.	
1	Abdul Huq Meah ...	Charipur ...	1 0	10 20	9 0	1 20	4 8	4 8 Loss	Aman.
2	Muhammad Syed ...	Lakshipur ...	0 10	9 0	8 10	0 30	2 4	6 12 ,,	Do.
3	Chandra Nath Mazumdar.	Sultanpur ...	0 10	10 20	10 20	.....	.....	9 0 ,,	Do.
4	Kasbim Baksh ...	Bejoy Sing ...	0 10	5 10	6 0	0 30	2 4	11 4 ,,	Do.
5	Hyder Ali	Baraipur ...	0 5	5 4	5 4	.....	.....	9 0 ,,	Do.
6	Abdul Ganni	Mathihara ...	0 10	6 30	6 30	.....	.....	9 0 ,,	Do.
7	Basaruddin Ahmed ...	Ditto ...	0 10	7 2	7 20	0 18	1 6	10 6 ,,	Do.
8	Gopal Kishore Sil ...	Doulatpur ...	0 10	9 0	6 30	2 10	3 12	5 4 ,,	Do.
9	Gagan Chandra Sil ...	Ditto ...	0 10	4 20	3 0	1 20	4 8	4 8 ,,	Do.
10	Muhammad Faiz ...	Rampur ...	0 10	10 32	10 32	.....	.....	9 0 ,,	Do.
11	Dina Bandhu Banik ...	Malipur ...	0 10	9 0	7 20	1 20	4 8	4 8 ,,	Do.
12	Hari Mohan Das ...	Sonapur ...	0 10	6 30	6 12	0 18	1 6	7 10 ,,	Do.
13	Krishna Mohan Das ...	Ditto ...	0 5	3 0	6 0	6 0	.....	9 0 ,,	Do.
14	Dana Miah	Biraiji ...	0 10	3 30	3 0	0 30	2 4	6 12 ,,	Do.
15	Abdul Patari	Malipur ...	0 10	12 30	12 0	0 30	2 4	6 12 ,,	Do.
16	Basiruddin Ahmed ...	Pachgachia ...	0 10	7 32	7 32	.....	.....	9 0 ,,	Do.
17	A. Rahaman	Ditto ...	0 10	7 2	7 20	0 18	1 6	10 6 ,,	Do.

Bonemeal Demonstration.

SUBDIVISION—BRAHMANBARIA.

			CUBITS.		MDS. SRS.		MDS. SRS.		MDS. SRS.		RS. A.	RS. A.		
1	Nil Madhab Barman Roy.	Brahmanbaria	63	45½	13	10	12	31	0	19	1 7	7 9	loss	Aman.
2	Iswar Chandra Barman Roy.	Fulbaria ...	63	42	15	21	14	10	1	11	3 14	5 2	,,	Do.
3	Jamini Kumar Barman Roy.	Brahmanbaria	70	63	17	22	17	0	0	22	1 12	7 4	,,	Do.
4	Rahimuddin	Fairtala ...	70	42	25	20	23	22	1	38	5 12	3 4	,,	Do.
5	Muncharali	Ditto ...	70	42	18	37	17	27	1	10	3 12	5 4	,,	Do.
6	Ditto	Ditto ...	70	63	15	36	15	5	0	31	4 10	4 6	,,	Jute.
7	Ichan ali	Ditto ...	70	84	22	8	21	35	0	13	1 2	7 14	,,	Aman.
8	Abdul Abad	Talsahar ...	70	84	7	16	6	11	1	5	4 8	4 8	,,	Mustard.
9	Birbal	Ditto ...	70	84	9	0	7	2	1	38	11 13	2 13	profit	Ditto.
10	Najibullah	Natai ...	105	126	15	8	14	0	1	8	7 3	1 13	loss	Jute.
11	Jahabox	Do. ...	70	84	16	14	13	20	2	34	17 2	8 2	profit	Do.
12	Kaimullah	Do. ...	63	42	15	30	12	30	3	0	18 0	9 0	,,	Do.
13	Kahetullah	Do. ...	63	42	15	30	14	10	1	20	4 8	4 8	loss	Do.
14	Mainaddin	Do. ...	70	84	31	11	28	15	2	26	15 15	6 15	profit	Do.
15	Faizaddin	Do. ...	63	45½	20	16	11	38	8	18	50 11	41 11	,,	Do.
16	Rashid	Do. ...	70	42	14	25	11	12	3	13	19 15	10 15	,,	Do
17	Maksud Ali	Bhatpara ...	70	84	15	29	14	6	1	23	9 9	0 9	,,	Do.
18	Abu	Do. ...	70	84	19	13	17	5	2	8	13 4	4 4	,,	Do.
19	Tarar Bap	Barial ...	105	119	15	19	13	11	2	8	13 4	4 4	,,	Do.
20	Kailash Chandra Chakravarty.	Mirjapur ...	63	42	14	25	12	32	1	33	11 0	2 0	,,	Do.
21	Rohini Chowdhury ...	Ditto ...	70	84	16	17	14	2	2	15	14 4	5 4	,,	Do.
22	Ditto ...	Ditto ...	70	84	16	34	13	29	3	5	18 12	9 12	,,	Do.
23	Ditto ...	Ditto ...	70	84	14	0	10	24	3	16	20 16	11 6	,,	Do.
24	Ram Sundar Kapali ...	Dhemsa ...	112	81	37	39	26	19	9	20	19 0	10 0	,,	Onion.

APPENDIX (IB).

Bonemeal residual effects—Brahmanbaria.

Serial No.	Name of the cultivators.	Village.	Length and breadth of the plot.	Difference of yield per acre between manured and unmanured plot in 1913.	Difference of yield between manured and unmanured plot in 1914.	Cumulative difference per acre for the two years.	Total profit.	REMARKS.
1	2	3	4	5	6	7	8	9
				Mds. Srs.	Mds. Srs.	Mds. Srs.	Rs. A.	
1	Koilash Mistry ...	Ramrail ...	36 30	12 15	0 18	12 33	29 7	
2	Devendra Chandra Datta.	Ditto ...	36 30	7 0	0 13	7 13	13 0	
3	Krishna Kumar Sen ...	Urshiura ...	36 30	6 30	1 27	8 17	16 4	
4	Abinash Chandra Datta ...	Paitarhata...	36 30	5 5	0 18	5 23	7 11	
5	Jalaluddin ...	Brahmanbaria	36 30	8 15	0 18	8 33	17 8	
6	Sreedhan Nama Sudra ...	Ditto ...	36 30	5 35	0 5	6 0	9 0	
7	Atul Chandra Dhupi ...	Urshiura ...	36 30	0 0	1 27	1 27	4 0	loss.
8	Monohar Kha ...	Ramrail ...	36 30	5 25	0 24	6 9	9 11	
9	Bepari	Ditto ...	36 30	0 0	0 22	0 22	7 5	loss.

Bonemeal residual effects—Chittagong.

Serial No.	Name of the cultivator and village.	Area of the plot.	Difference of yield per acre between manured and unmanured plot in 1913.	Difference of yield between manured and unmanured plot in 1914.	Cumulative difference per acre for the two years.	Total profit.	REMARKS.
1	2	3	4	5	6	7	8
			Mds. Srs.	Mds. Srs	Mds. Srs.	Rs. A.	
1	Abdul Ganni Sadagar, Lamarbazar	1 bigha ...	6 0	3 0	9 0	18 0	
2	Maulavi Kazimali Mia, Bakali ...	Ditto ...	0 30	3 0	3 30	2 4	
3	Abdul Litip Munshi, Lallsha bazar.	Ditto ...	7 20	0 30	8 10	15 12	
4	Nurali, Lallsha bazar	Ditto ...	6 0	1 20	7 20	13 8	
5	Hamdu Mia, Lallsha bazar ...	Ditto ...	9 0	0 30	9 30	20 4	
6	Narayan Singh Subadar, Bagmani Rampur.	Ditto ...	3 0	0 0	3 0	0 0	

District Tippera—Subdivision Comilla-Sadar—Crop Aman Paddy.

Serial No.	NAME.	Village.	Length and breadth of the plot.	Quantity selected and sown.	Yield of the plot.	Yield of the checkplot.	Yield per acre of the plot.	Yield per acre of the check plot.	Difference.
1	2	3	4	5	6	7	8	9	10
			YDS.	S. CH.	MD. SRS.	MD. SRS.	MD. SRS.	MDS. SRS.	MDS. SRS.
1	Symaddi ...	Durgapur ...	40 40	0 4	5 38	5 35	18 0	17 31	0 9
2	Anu Mia ...	Noapara ...	50 20	0 4	4 2	4 1	19 24	19 19	0 5
3	Abdul Ali ...	Ghoramara ...	20 30	0 4	2 32	2 30	22 23	22 7	0 16
4	Choitanya Krishna De	Durgapur ...	45 40	0 4	8 25	8 22	23 7	22 39	0 8
5	Boikunta Chandra De	Durgapur ...	50 40	0 4	9 37	9 35	28 0	23 35	0 5
6	Jogesh Chandra De ...	Durgapur ...	30 20	0 4	2 30	2 30	22 7	22 7	0 0
7	Amzad Ali ...	Krishnapur ...	25 20	0 4	2 20	2 22	24 8	24 8	0 0
8	Nur Ali ...	Narpur ...	30 30	0 4	4 2	4 1	21 31	21 26	0 5
9	Anu Bali ...	Araiura ...	40 20	0 4	3 30	3 29	22 27	22 21	0 6
10	Bacharaddi ...	Jagannathpur ...	20 15	0 4	1 20	1 19	24 8	23 32	0 16

APPENDIX II.

District Tippera—Subdivision Brahmanbaria—Crop Jute.

Serial No	NAME.	Village.	Length and breadth of the plot.	Quantity selected and sown.	Yield of the plot.	Yield of the check plot.	Yield per acre of the plot.	Yield per acre of the check plot.	Difference.
2	1	3	4	5	6	7	8	9	10
			Yds.	S. Ch.	M. S.	M. S.	M. S.	M. S.	M. S.
1	Harish Chandra De ...	Kendui	4½ 11	0 4	0 12	0 10	29 14	24 18	4 38
2	Haran Chandra Mali...	Do.	6½ 14½	0 4	0 11	0 8	14 6	10 10	3 36
3	Girish Chandra Sil ...	Do.	6½ 12½	0 4	0 9	0 8	13 36	12 8	0 17
4	Mahim Chandra Dhupi	Do.	3½ 15	0 4	0 10	0 9	23 10	20 37	2 13
5	Kailash Chandra Dhupi.	Do.	3 24	0 3	0 11	0 10	18 19	13 30	1 11
6	Bhairab Chandra De	Do. ...	6 4	0 4	0 8	0 7	40 13	35 11	4 2
7	Dwega Sankar Bhattacharji.	Weshiwra ...	7½ 5	0 3	0 7	0 6	22 35	19 24	3 11
8	Bipin Chandra Dhupi	Do. ...	12 5	0 4	0 10	0 8	20 6	16 5	4 1
9	Jamini Kanta Burman	Poirtala ...	5 7½	0 4	0 10	0 8	32 11	26 5	6 6
10	Jananuddin ...	Bhedoshudar ...	20 10	0 8	0 20	0 18	12 8	10 35	1 13
11	Hari Mohan Roy ...	Singesbil ...	10 5	0 4	0 8	0 7	19 24	16 37	2 27
12	Mohendra Kumar Gupta.	Bhola kot ...	12½ 7½	0 4	0 9	0 8	12 9	10 27	1 22
13	Bhadu Kapali ...	Ditto	15 5	0 4	0 10	0 9	16 5	14 16	1 29

District Tippera—Subdivision Chandpur—Crop Jute.

			Yds.	S. Ch.	M. S.	M. S.	M. S.	M. S.	M. S.
1	Ismail Pradhania ...	Bismupur ...	49/2 49/2	0 4	0 20	0 18	4 1	3 29	0 12
2	Bande ali munshi ...	Do.	49/2 49/2	0 4	0 25	0 15	5 1	3 0	2 1
3	Apta Baddin Rari ...	Do.	49/2 49/2	0 4	0 30	0 19	6 2	3 34	2 8
4	Samud Ali Peda ...	Do.	49/2 49/2	0 4	0 20	0 18	4 1	3 29	0 12
5	Nabin Chandra Dhupi	Mabarakali ...	61/2 61/2	0 5	0 0	0 38	5 8	4 36	0 12
6	Ajgor Ali Haidar ...	Silmaddi ...	49/2 49/2	0 4	0 20	0 19	4 1	3 34	0 7
7	Kazimaddi Pradhania	Do.	73½ 73½	0 6	1 5	1 0	4 1	3 23	0 18
8	Abdul Zabbar Pradhania.	Do.	49/2 49/2	0 4	0 25	0 17	5 1	3 17	1 24
9	Mafizuddin Pradhania	Do. ...	49/2 49/2	0 4	0 30	0 17	6 2	3 17	2 25
10	Mainaddi Pradhania	Mabarakali ...	49/2 49/2	0 4	0 20	0 15	4 1	3 0	1 1
11	Mainaddi Kazi ...	Silmaddi ...	49/2 49/2	0 4	0 23	0 18	4 25	3 29	0 36

District Noakhali—Subdivision Sadar—Crop Jute.

			Yds.	S. Ch.	M. S.	M. S.	M. S.	M. S.	M. S.
1	Ram Kumar De ...	Gupta-anka ...	82 16	0 10	3 30	1 4	13 33	4 2	9 31
2	Ambika Charan Mukteari.	Ditto ...	50 25½	0 12	4 7	2 10	15 33	8 20	7 13
3	Kula Chandra Dey ...	Ditto ...	45 20 / 30 12	0 7	1 38	1 15	11 5	8 8	2 37
4	Korban Ali	Kashirampur ...	45½ 23	0 9	3 0	2 10	13 34	9 28	4 6
5	Mula Mia	Fakirpur ...	28½ 25½	0 9	2 18	2 0	16 12	13 32	2 20
6	Meher Ali	Do. ...	80 20	0 8	4 20	3 12	13 24	9 39	3 25
7	Indra Chandra Bhowmick.	Joykrishnapur...	41 15	0 6	2 20	2 10	19 20	7 38	11 22
8	Akhaya Kumar Sil ...	Maizdi	40 40	0 10	4 0	3 88	12 4	9 27	2 17
9	Chandra Kumar Sardar.	Do.	42 18	0 5	3 9	2 20	20 19	19 30	0 29
10	Sarat Chandr Das ...	Darleshpur ...	36 20	0 8	2 11	3 38	15 11	13 4	2 7
11	Abdul Majid	Maizdi	45½ 42	0 12	4 24	4 6	11 26	10 14	0 12

Length and breadth of the check plot was 50×30½ yds.

APPENDIX III.

Potato Results.

NOAKHALI.

Serial No.	NAME	Village.	Length and breadth of the plots.	Quantity of seeds.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Price of yield per acre.	Profit or loss per acre.	Variety of seed.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			YDS	M. S.	M. S.	M. S.	M. S.	RS. A.	Rs. A.	RS. A.		
1	Kamini Kumar Dhupi	Harinarayanpur	30 24	0 28	9 0	10 30	282 0	102 8	726 0	618 8	Darjeeling.	
2	Chandra Kumar Sardar.	Maizdi ...	34 16	0 5	4 30	4 14	169 0	43 8	507 0	463 8	Ditto.	
3	Abdul Nazir ...	Do. ...	44 20	0 19	10 20	10 18	231 0	104 8	693 0	588 8	Ditto.	
4	Abdul Bari Pandit ...	Do. ...	15 20	0 5	2 0	14 26	294 26	146 8	438 10	292 2	Ditto.	
5	Ashaya Kumar Sil ...	Do. ...	18 12 / 18 15	0 5	3 0	4 39	119 20	49 12	358 8	308 12	Ditto.	
6	Ram Kumar De ...	Amarpur ...	20 14	0 10	3 0	19 13	207 17	192 12	652 5	459 9	Ditto.	
7	Haramath Chakravarty	Maizdi ...	43 20	0 20	8 20	11 10	191 13	112 8	574 0	461 8	Ditto.	
8	Purna Chandra De ...	Maheshpur ...	18 10	0 10	1 33½	26 37	197 25	269 4	592 14	323 10	Ditto.	
9	Hara Kishar Bhattacharjee.	Noakhali ...	15 12 / 12 10	0 20	2 35	32 10	185 20	322 8	556 8	234 0	Ditto.	
10	Bharat Chandra Har	Baitola	26 12	0 10	2 30	15 15	169 5	153 12	507 6	353 10	Ditto.	
11	Sadak Ali	Krisnarampur ...	56 35	1 0	14 0	9 11	134 17	92 12	403 5	310 9	Ditto.	
12	Tarani Chandra Sirkar.	Joykrishnapur ...	64 24	0 24	9 0	7 22	113 17	75 8	340 5	264 13	Ditto.	
13	Abdul Majid	Krishnarampur ...	25 25	0 10	3 30	7 29	116 6	77 4	348 7	271 3	Ditto.	
14	Nishi Chandra Lod ...	Shibpur ...	47 40	0 35	10 35	49 13	141 39	193 0	335 14	142 14	Ditto.	
15	Manindra Babu ...	Noakhali ...	12 40	0 5	1 2	18 13	154 0	183 4	462 0	278 12	Ditto.	
16	Joyada Prasanna Datta.	Do. ...	20 14	0 15	4 20	25 37	103 27	259 4	311 0	51 12	Ditto.	
17	Ananda Chandra Majumdar.	Maizdi ...	33 14	0 20	5 0	26 26	266 26	266 8	800 5	533 13	Ditto.	
18	Mohahasak Kolar ...	Maizdi	20 15 / 35 10½	0 10	4 0	7 17	188 33	74 4	566 5	492 1	Ditto.	
19	Taraprasanna Chakavarty.	Do.	54 15½ / 24 15½	0 20	5 10	8 10	86 14	82 8	259 3	176 11	Ditto.	
20	Kamini Kumar Dhar	Chamrakhola ...	32 20	0 20	5 20	15 5	116 15	151 4	349 0	197 19	Ditto.	
21	Ali Miyan	Lakhinarayanpur	47 14	0 10	2 0	7 14	58 32	73 8	176 6	92 14	Ditto.	
22	Nur Mian	Maizdi	18 15	0 5	1 37	9 0	138 0	90 0	414 0	324 0	Ditto.	
23	Tuka Mian	Do.	21 15	0 5	1 29	7 29	106 0	76 12	318 0	241 4	Ditto.	
24	Hossain Ali	Amirabad	40 9	0 5	0 30	6 3	40 13	60 12	421 0	60 4	Ditto	
25	Jogesh Chandra Chakravarty.	Alipur	32 32	0 20	3 0	9 18	56 27	94 8	170 7	75 15	Ditto.	
26	Dula Miyan Mukhtar	Chamrakhola ...	35 20 / 40 30	0 20	4 0	5 4	40 32	51 0	125 9	74 9	Ditto	Yield from the very tiny tubers.
27	Mohammad Rasad Miyan.	Kassimpur ...	35 25 / 41 34	1½ 0	4 20	12 9	36 27	122 4	112 11	9 9	Ditto	loss.
28	Akhoy Kumar De ...	Amarpur	20 18	5 9	0 30	6 28	39 28	67 0	119 2	52 2	Ditto	
29	Ambica Charan De ...	Gupta Anka ...	56 28 / 30 27 / 38 28	2 10	43 20	12 29	246 4	127 4	738 5	611 1	Ditto.	
30	Ram Kumar De ...	Ditto ...	25 10	5 0	0 25	9 26	49 10	96 8	147 12	51 4	Ditto.	
31	Tarak Chandra Pal ...	Sataulia	20 20	6 0	1 0	7 8	48 16	72 0	145 3	73 3	Ditto.	
32	Harish Chandra Pal ...	Ditto	24 12	2½ 0	1 15	5 28	115 9	57 0	345 11	288 11	Ditto.	
33	Parbati Charan Kabiraj.	Madhubsing ...	18 12	5 0	3 25	11 8	324 36	112 0	974 12	862 12	Ditto.	
34	Devendra Nath Chakravarty.	Maizdi	30 28 / 20 10 / 10 8	1 0	4 30	17 11	82 4	120 14	246 5	125 7	Nainital.	
35	Tara Prasanna Chakravarty.	Do.	54 10	0 20	1 20	17 37	53 31	125 8	161 6	35 14	Ditto.	
36	Chandra Kumar Sardar.	Do.	34 18	0 20	1 28	45 32	53 37	140 9	161 8	50 15	Ditto.	
37	Akhaya Kumar Sil ...	Do.	18 14	0 5	1 20	9 24	115 8	67 3	345 10	278 7	Ditto.	
38	Gopal Chandra Chakravarty.	Do.	28 14	0 10	1 20	12 13	74 0	86 7	220 0	135 9	Ditto.	

N.B.—The price of seed potato is Rs. 10 for Darjeeling.
Rs. 7-8 for Nainital.
Market rate of potato has been on the average Rs. 3 per maund.

Potato results—Noakhali—*concluded.*

Serial No.	NAME.	Village.	Length and breadth of the plot.	Quantity of seeds.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Price of yield per acre.	Profit or loss per acre.	Variety of seed.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			YDS.	M. S.	M. S.	M. S.	M. S.	RS. A.	RS. A.	RS. A.		
39	Sarat Chandra De ...	Alipur	64 12	4 0	5 0	25 8	126 0	176 7	378 0	201 5	Nainital.	
40	Ram Kumar De ...	Amarpur	20 14	0 10	1 32	7 11	124 17	121 0	375 2	254 2	Ditto.	
41	Mohim Chandra Nag...	Baharpur	34 18	0 20	3 0	15 32	96 32	110 9	290 7	179 14	Ditto.	
42	Ambica Charan De ...	Gupta Anka ...	38 21 / 50 40 / 70 35 / 85 60	0 7·8	67 20	15 10	183 13	406 12	549 14	443 2	Ditto.	
43	Ram Kumar Dey ...	Ditto ...	50 25	0 30	2 35	11 24	44 20	81 8	133 9	52 1	Ditto.	
44	Kamini Dhubi ...	Harinarayanpur...	31 24	0 30	5 0	18 3	118 25	126 9	355 14	228 5	Ditto.	
45	Khirod Chandra Majumdar.	Urzalpur	73 57	2 30	15 0	12 31	69 31	89 7	209 5	119 14	Ditto.	
46	Basanta Kumar De ...	Krismarampur ...	28 20	0 10	0 25	8 35	22 8	62 2	66 9	4 7	Ditto.	
47	Tarak Chandra Pal ...	Satatia	20 4	0 2	0 15	12 4	90 30	84 12	272 4	187 8	Ditto.	
48	Parbati Chandra Kabiraj.	Madhabsingh ...	14 18	0 5	2 22	9 24	196 36	66 14	590 7	523 9	Ditto.	
49	Karban Ali	Fakirpur	24 18	0 15	2 30	16 32	123 9	117 9	369 11	252 2	Ditto.	
50	Barat Chandra Har ...	Baruitala	12 4	0 2½	0 10	25 8	100 32	176 7	302 7	126 0	Ditto.	

Potato results—Chittagong.

Serial No.	Name.	Village.	Length and breadth of the plot in cubits.	Quantity of seeds.	Variety of seeds.	Yield of the plots.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Money value of the yield per acre.	Profit or loss per acre.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Cubits.	M. S.		M. S.	M. S.	M. S.	RS. A.	RS. A.	RS. A.	
1	Rasa Mia ...	Nasirabad ...	672 0	0 20	Nainital	5 20	14 16	129 25	100 8	388 14	288 6	Profit.
2	Nazir Ali ...	Ditto ...	23 19	0 17	Ditto ...	1 15	18 32	60 36	131 9	182 10	51 1	Do.
3	Ali Mia ...	Ditto ...	22½ 18½	0 20	Ditto ...	1 19	23 10	68 24	162 12	206 2	43 6	Do.
4	Ahamed Ali ...	Ditto ...	8 19	0 3	Ditto ...	0 10	9 21	31 33	66 10	96 6	29 12	Do.
5	Ali Mia ...	Ditto ...	26 12	0 6	Ditto ...	0 24	11 20	43 3	80 8	129 4	48 12	Do.
6	Annada Charan Barua.	Pahartali ...	24 36 / 25 39	0 36	Ditto ...	3 25	9 19	37 25	66 0	113 4	47 4	Do.
7	Mahima Ranjan Barua.	Chittagong ...	40 48	0 30	Ditto ...	4 15	7 22	44 4	52 13	142 5	89 8	Do.
8	Abdul Choban ...	Purangur ...	30 50	0 35	Ditto ...	2 3	8 2	26 30	56 5	80 0	23 11	Do.
9	Moulavi Kazimali Mia.	Bakalia ...	12 21	0 5	Ditto ...	0 10	4 25	9 14	32 14	28 0	3 2	Loss.
10	Nazir Ali ...	Nasirabad ...	23 20	0 17	Darjeeling	1 30	17 31	73 31	177 12	221 7	43 11	Profit.
11	Ali Mia ...	Ditto ...	23½ 17	0 15	Ditto ...	2 5	18 39	107 22	189 12	322 11	132 15	Do.
12	Ahamed Ali ...	Ditto ...	20 19	0 14	Ditto ...	1 10	17 31	63 22	177 12	190 13	13 1	Do.
13	Tofel Ahmed ...	Charia ...	26 12	0 7	Ditto ...	1 10	10 34	77 22	108 8	232 10	124 2	Do.
14	Moulavi Abul Khoir.	Agrabad ...	44 36	0 20	Ditto ...	2 5	6 28	28 26	67 0	85 14	18 14	Sown in a shady place notwithstanding our remonstrations.
15	Har Kishore Barua	Pahartali ...	48 23	0 20	Ditto ...	2 5	8 10	37 10	82 8	111 12	29 4	Some unknown disease affect outturn.
16	Ahmed Hosein ...	Panchalaish ...	20 35	0 10	Ditto ...	4 35	13 30	134 10	137 8	402 12	265 4	Ditto.
17	Annada Charan Barua.	Pahartali ...	20 23	0 5	Ditto ...	0 20	5 10	21 1	52 8	63 1	10 9	Some unknown disease.
18	Chittagong Jail ...	Chittagong ...	13 28 / 29 25	1 0	Ditto ...	7 10	17 30	128 30	177 8	386 0	208 8	Ditto.
19	Moulavi Kazimali Mia.	Bakalia ...	30 21	0 10	Ditto ...	0 20	7 20	15 14	75 0	46 0	29 0	Loss. unsuitability of the soil.
20	Nur Ahamed Chowdhury.	Sita Kund ...	24½ 28 / 35 4	0 20	Ditto ...	2 0	11 20	57 6	115 0	171 7	56 7	Profit. Damaged by wild pigs.
21	Abdul Choban ...	Purangar ...	35 55	0 30	Ditto ...	2 25	7 21	26 9	75 4	78 0	2 12	Profit. Destroyed by excessive rain.

N. B.—The price of seed potato is Rs. 10 for Darjeeling.
Ditto Ditto Rs. 7-8 for Nainital.
The Market rate of potato is on the average Rs. 3 per maund.

Potato results—Chittagong—*concluded.*

Serial No.	Name.	Village.	Length and breadth of the plot in cubits.	Quantity of seeds.	Variety of seeds.	Yield of the plots.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Money value of the yield per acre.	Profit or loss per acre.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Cubits.	M. S.		M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.	
22	Mazizar Rahaman	Bazalia ...	12 20	0 7	Darjeeling	0 35	14 3	7 23	98 12	211 12	113 0	Profit. Destroyed by excessive rain.
23	Babu Sanath Chandra Das.	Rahamatganj	12 5 7 6 10 14	0 14	Ditto ...	1 34	25 34	136 28	250 8	410 2	151 10	Ditto.
24	Umesh Chandra De	Jafornagar ...	20 40	0 30	Ditto ...	4 0	18 6	92 32	181 8	278 6	196 14	Ditto.
25	Ramgati De ...	Bazalia ...	20 13	0 10	Ditto ...	0 12	18 24	22 13	186 0	66 15	119 1	Loss. Destroyed by rain.
26	Perat Ali ...	Ditto ...	27 16	0 10	Ditto ...	0 13	11 6	14 22	111 8	43 9	67 15	Ditto.

N.B.—The price of seed potato is Rs. 10 for Darjeeling.
Ditto Ditto Rs. 7-8 for Nainital.
The Marked rate of potato is on the average Rs. 3 per maund.

Potato results—Comilla.

Serial No.	Name.	Village.	Length and breadth of the plots.	Quantity of seeds.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Money value of the yield per acre.	Profit or loss per acre.	Variety of crops.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Square yards. Area.	M. S.	M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.		
1	Ishan Chandra Nandi	Poirapara ...	101	0 8	0 8	9 21	23 38	95 4	65 4	30 0	Darjeeling	Loss.
2	Ram Sundar Nandi ...	Ditto ...	115	0 10	0 18	10 20	18 37	75 0	52 0	23 0	Ditto ...	Do.
3	Nagendra Chandra Roy.	Durgapur ...	315	0 20	5 36	7 27	90 26	76 12	249 4	172 8	Ditto ...	Profit.
4	Gobinda Chandra De	Kandirpar ...	59	0 5	0 30	11 37	71 26	119 4	197 0	81 12	Ditto ...	Do.
5	Rajani K. Bhattacharji.	Ditto ...	756	0 45	2 15	7 11	73 27	72 12	202 9	129 13	Ditto ...	Do.
6	Dwijendra M. Chakravarti.	Ditto ...	170	0 5	0 11	3 10	7 33	32 8	21 2	11 6	Ditto ...	Loss.
7	Hasan Ali ...	Dasangacha ..	105	0 10	1 3	10 22	49 22	105 8	136 4	30 12	Ditto ...	Profit.
8	Dwarka N. Banerji ...	Comilla ...	73	0 5	0 7½	8 11	12 17	82 12	34 2	48 10	Ditto ...	Loss.
9	Afzal Hossain, S. D. O.	Feni	1 24	0 10	0 30	9 17	29 10	94 4	80 7	13 13	Ditto ...	Do.
10	Krishna M. Majumdar	Shilmuri ...	63	0 5	0 32	9 35	60 29	98 12	166 15	67 3	Ditto ...	Profit.
11	Ishan Chandra Majumdar.	Ditto ...	72	0 5	0 30	16 31	100 33	167 12	277 3	105 7	Ditto ...	Do.
12	Behari Ch. Majumdar	Ditto ...	60	0 5	0 12	12 4	24 8	121 0	66 8	54 8	Ditto ...	Loss.
13	Rajani Kumar Chakravarti.	Ditto ...	72	0 5	0 20	8 16	33 25	84 0	92 6	8 6	Ditto ...	Profit.
14	Hasan Ali ...	Ditto ...	66	0 5	0 18	9 15	30 29	93 12	84 8	9 4	Ditto ...	Loss.
15	Rammani Kyachanga	Ditto ...	64	0 5	0 20	9 15	37 33	93 12	104 2	10 6	Ditto ...	Profit.
16	Ram Sundar De ...	Ditto ...	56	0 5	0 23	11 35	49 28	107 12	136 10	28 14	Ditto ...	Do.
17	Chandra Mani Dhupi	Shilmuri ...	63	0 5	0 15	9 25	28 33	96 4	79 3	17 1	Ditto ...	Loss.
18	Hassan Ali ...	Lukhipur ...	65	0 5	1 1	9 15	75 13	93 12	203 4	112 8	Ditto ...	Profit.
19	Rahimuddin ...	Ghushya ...	52	0 5	0 7	10 20	16 12	105 0	44 13	60 3	Ditto ...	Loss.
20	Meher Ali ...	Goyam ...	81	0 5	0 20	7 18	29 35	74 8	82 2	7 10	Ditto ...	Profit.
21	Kali Krishna Dhar ...	Dhaneswar ...	64	0 5	0 15	9 15	28 15	93 12	78 0	15 12	Ditto ...	Loss.
22	Gonnat Ali ...	Kansannagar ...	432	1 0	2 20	11 5	28 0	111 4	77 0	34 4	Ditto ...	Do.
23	Rahmat Ali ...	Ditto ...	45	0 5	0 15	13 15	40 13	133 12	110 14	21 14	Ditto ...	Do.
24	Ditto	Ditto ...	44	0 5	0 10	13 30	27 20	137 8	75 10	61 14	Ditto ...	Do.
25	Peroj Ali	Ramchandrapur...	112	0 10	0 30	10 32	32 16	108 0	89 1	18 15	Ditto ...	Do.
26	Ansur Ali	Ditto ...	52	0 5	0 17	12 30	39 22	127 8	108 12	18 12	Ditto ...	Do.
27	Rahmat Ali ...	Ditto ...	52	0 7½	0 35	11 35	60 20	118 12	166 6	47 10	Ditto ...	Profit.
28	Piarbaksh ...	Ditto ...	100	0 10	1 10	12 4	60 20	121 0	166 6	45 6	Ditto ...	Do.
29	Sayed Ali ...	Ulta Ramanpur ...	96	0 10	1 0	12 24	50 17	126 0	138 10	12 10	Ditto ...	Do.
30	Satish Chandra Nandi	Laksam ...	64	0 5	0 20	18 36	75 25	189 0	207 15	18 15	Ditto ...	Do.

N. B.—The price of seed potato is Rs. 10 for Darjeeling.
Ditto ditto Rs. 7-8 ,, Nainital.
The price of potato in Comilla varies from Rs. 2 to Rs. 3.

Potato results—Comilla—*continued.*

Serial No.	Name.	Village.	Length and breadth of the plots.	Quantity of seeds.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Money value of the yield per acre.	Profit or loss per acre.	Variety of crops.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Square yards. Acre.	M. S.	M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.		
31	Md. Faiz	Laksam ...	64	0 5	0 25	9 18	47 11	94 8	130 0	35 8	Darjeeling	Profit.
32	Hasan Ali ...	Barkanta ...	62	0 5	1 5	9 30	87 33	97 8	241 8	144 0	.....	Do.
33	Rajab Ali	Belashaw ...	153	0 15	3 10	11 32	102 3	118 0	280 11	162 11	Darjeeling	Do.
34	Golak Chandra De ...	Ditto ...	117	0 10	1 10	10 6	51 29	101 8	142 3	40 11	Ditto	Do.
35	Md. Sakhawat Hossain	Ditto ...	90	0 6½	0 25	8 14	33 25	83 8	92 7	8 15	Ditto	Do.
36	Ginnat Ali ...	Maharaing ...	70	0 5	0 25	8 25	69 6	86 4	190 2	103 14	Ditto	Do.
37	Afsaraddin ...	Belashaw ...	63	0 6	1 37	11 20	147 36	115 0	404 4	289 4	Ditto	Do.
38	Minsar Ali ...	Ditto ...	114	0 10	1 0	10 25	42 20	106 4	116 14	10 10	Ditto	Do.
39	Ditto ...	Ditto ...	89	0 10	0 25	13 22	33 30	135 8	100 7	35 1	Ditto	Do.
40	Salamat Khan ...	Chandina ...	56	0 5	0 25	10 32	54 1	108 0	140 9	32 9	Ditto	Profit.
41	Azimuddin...	Belashaw ...	180	0 15	3 10	10 3	87 16	100 12	240 5	139 9	Ditto	Do.
42	Mathura M. Mahatya	Do. ...	50	0 5	0 19	11 5	46 9	111 4	127 2	15 14	Ditto	Do.
43	Ram Chandra Nath. ...	Do. ...	62	0 5	0 36	9 30	70 10	97 8	193 3	95 11	Ditto	Do.
44	Ram Manikya Nath ...	Bashanta Bazar ...	70	0 5	0 30	8 25	51 30	86 4	142 5	56 1	Ditto	Do.
45	Dina Nath Das ...	Ditto ...	935	1 35	10 25	9 28	55 0	97 0	151 4	54 4	Ditto	Do.
46	Faizuddin	Srimanthapur ...	60	0 5½	1 0	12 30	80 20	127 8	221 6	93 14	Ditto	Do.
47	Asmat Ali	Ditto ...	52	0 5	0 35	11 26	81 22	116 8	224 4	107 12	Ditto	Do
48	Satish Ch. Sen ...	Ditto ...	164	0 22	12 10	16 8	361 20	162 0	994 2	832 2	Ditto	Do.
49	Elahi Baksh	Chandina ...	180	0 17	10 0	11 16	268 35	114 0	749 6	635 6	Ditto	Do.
50	Aftabuddin	Ditto ...	42	0 5	0 30	14 16	86 16	144 0	237 15	93 15	Ditto	Do.
51	Ramjan Ali	Ditto ...	224	0 20	3 0	10 32	64 32	108 0	178 3	70 3	Ditto	Do.
52	Ali Miyan	Ditto ...	96	0 10	2 0	12 24	98 32	126 0	271 11	155 11	Ditto	Do.
53	Ditto	Ditto ...	100	0 10	1 27	12 4	81 3	121 0	223 0	102 0	Ditto	Do.
54	Ansur Ali	Ramchandrapur ...	52	0 5	0 17	12 30	39 22	127 8	98 12	28 12	Ditto	Loss.
55	Maimullah	Ditto ...	100	0 10	0 38	10 35	36 9	108 12	99 9	9 3	Ditto	Do.
56	Easin	Kanchannagar ...	124	0 10	0 20	9 30	19 21	97 8	53 11	33 13	Ditto	Do.
57	Jahiruddin	Uttar Rameupur. .	60	0 5	0 16	10 5	32 10	101 4	88 11	12 9	Ditto	Do.
58	Niyaet Ali	Srimanthapur ...	140	0 12½	0 30	10 32	26 0	108 0	71 8	36 8	Ditto	Do.
59	Nawab Ali	Ditto ...	60	0 5	0 30	12 3	17 18	120 12	199 3	1 9	Ditto	Do.
60	Nogendra Ch. Ray ...	Durgapur ...	46	0 5	0 30	13 6	78 17	92 1	217 9	125 8	Nainital	Profit.
61	Dwijendra M. Chakravarti.	Kandirpur ...	70	0 6½	0 8	9 25	13 33	67 6	67 14	0 8	Ditto	Do.
62	Lalit Chandra Dutta...	Laksham ...	120	0 10	1 10	10 3	50 17	100 12	138 10	37 14	Ditto	Do.
63	Jinnat Ali	Maharang ...	135	0 15	2 7	13 19	87 9	94 8	239 13	145 5	Ditto	Do.
64	Harj Charan Choudhuri.	Chandina ...	40	0 5	0 20	20 7	60 30	141 4	167 0	15 12	Ditto	Do.
65	Akram Ali	Belashaw ...	72	0 7½	0 30	12 31	51 5	89 3	140 9	51 6	Ditto	Do
66	Sadamaddin	Ditto ...	93	0 10	1 0	13 0	52 1	91 0	142 1	52 1	Ditto	Do.
67	Golamoddin	Ditto ...	50	0 5	0 25	12 6	60 30	85 0	170 4	85 4	Ditto	Do.
68	Shabaddin	Ditto ...	47	0 5	0 10	12 34	25 29	86 5	170 11	84 6	Ditto	Do.
69	Satish Chandra Sen ...	Srimanthapur ...	284	0 22	7 15	9 15	124 20	65 10	342 6	276 12	Ditto	Do.
70	Mal Khan	Ditto ...	44	0 5	0 20	13 30	55 0	96 4	151 4	55 0	Ditto	Do.
71	Safaruddin	Chandina ...	41	0 5	0 20	14 30	59 0	103 4	162 4	59 0	Ditto	Do.
72	Aftabuddin	Ditto ...	60	0 7½	0 32	15 5	64 21	105 14	179 7	63 9	Ditto	Do.
73	Ram Kumar Pal ...	Baghimara ...	85	0 10	0 20	11 21	23 2	80 10	63 6	17 4	Ditto	Loss.
74	Nishi Kanta Bose ...	Moinamati ...	58	0 7½	0 12	10 15	25 1	72 10	68 13	3 13	Ditto	Do.
75	Dwarka N. Dutta ...	Dilpur ...	408	1 0	0 35	11 34	10 15	82 15	28 8	53 7	Ditto	Do.
76	Rajant K. Shattacharji.	Kandirpur ...	147	0 15½	0 25	15 10	25 34	106 12	71 1	35 11	Ditto	Do.
77	Kali Charan De ...	Ditto ...	45	0 5	0 3	10 25	8 3	74 6	20 3	54 3	Ditto	Do.
78	Debendra Ch. Majumdar.	Feni ...	90	0 10	0 15	13 5	20 7	91 14	55 8	36 6	Ditto	Do.
79	Ansur Ali	Ramchandrapur ...	36	0 5	0 7½	16 32	25 8	117 5	69 4	48 1	Ditto	Do.
80	Rahamat Ali	Ramchandrapur ...	72	0 8	0 10	13 30	27 20	137 8	74 2	63 6	Ditto	Do.

N. B.—The price of seed potato is Rs. 10 for Darjeeling.
Ditto ditto Rs. 7-8 ,, Nainital.
The price of potato Comilla varies from Rs. 2 to Rs. 3.

Potato results—Comilla—*concluded.*

Serial No.	NAME.	Village.	Length and breadth of the plots.	Quantity of seed.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Money value of the yield per acre.	Profit or loss per acre.	Variety of crops.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Squre yards Area.	M. S.	M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.		
81	Sukur Mamud... ...	Uttar Raminpur ...	32	0 5	0 7	18 36	26 19	189 0	72 12	116 4	Nainital	Loss.
82	Hasan Ali	Barkanta ...	54	0 5	0 16	12 20	37 39	125 0	104 6	20 10	Ditto ...	Do.
83	Rajab Ali	Belashaw ...	160	0 20	1 30	15 5	52 37	151 4	145 8	5 12	Ditto ...	Do.
84	Aminuddin	Baqur	73	0 7½	0 12	12 0	19 35	84 0	54 10	55 6	Ditto ...	Do.
85	Afsaruddin	Belashaw	46	0 5	0 11	14 5	28 37	94 14	79 8	15 6	Ditto ...	Do.
86	Azimuddin	Ditto	48	0 5	0 12	12 24	30 10	84 4	83 3	1 1	Ditto ...	Do.

N. B.—The price of seed potato is Rs. 10 for Darjeeling.
Di to ditto Rs. 7-8 ,, Nainital.
The price of potato in Comilla varies from Rs. 2 to Rs. 3.

Potato results—Brahmanbaria.

Serial No.	NAME.	Village.	Area of plot.	Quantity of seed.	Yield of plot.	Seed rate per acre.	Yield per acre.	Price of seed per acre.	Money value of yield per acre.	Profit or loss per acre.	Variety of seeds.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Sq. cubits.	M. S.	M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.		
1	Kali Kumar Sen ...	Urshiura	50	0 5	0 20	48 16	193 24	338 12	581 2	242 6	Darjeeling	Profit.
2	Bishayambar Nama ...	Masaura	180	0 12½	2 15	33 24	255 7	335 4	765 5	430 6	Ditto	Do
3	Gobinda Chandra Nama.	Ditto	25	0 3	0 10	58 3	193 24	580 12	581 0	1 12	Ditto	Do.
4	Sanatan Das	Ramrail	23	0 2½	0 15	52 24	324 26	526 0	977 0	451 0	Ditto	Do.
5	Nagendra Chandra Das.	Ditto	18	0 2½	0 15	67 8	403 13	672 0	1,210 0	538 0	Ditto	Do.
6	Kaku	Jogelsay	60	0 7½	1 3	60 20	346 38	605 0	1,040 12	435 12	Ditto	Do.
7	Ulfat Ali	Rasulabad ...	1,064	2 25	25 0	47 30	454 35	477 8	1,334 10	887 2	Ditto	Do.
8	Hinmat Ali	Ditto	420	1 0	5 0	46 3	230 19	460 12	691 6	230 10	Ditto	Do.
9	Tafazul Ali	Ruposdi	640	0 20	6 30	30 10	166 20	605 0	1,996 8	1,391 8	Ditto	Do.
10	Krishna Kumar Sen ...	Urshiura	10	0 1¼	0 4	60 30	193 24	606 0	581 0	25 0	Ditto	Loss
11	Jamini Kumar Barman	Pairtala	35	0 5	0 12	69 5	165 37	691 4	497 8	193 12	Ditto	Do.
12	Sree Dhan	Paitarhata ...	45	0 4	0 12	43 0	129 0	430 0	387 0	13 0	Ditto	Do.
13	Bharat Chandra De ...	Urshiura	21	0 2½	0 5	57 8	115 16	577 0	346 4	230 12	Ditto	Do.
14	Surendra Kishore Dutta.	Golampara ...	30	0 4	0 10	64 21	161 13	451 11	484 0	32 5	Nainital	Profit
15	Hira Nath Barman ...	Fulbaria	125	0 10	0 32	38 28	123 38	270 2	371 12	101 10	Ditto	Do.
16	Rajani Kanta Barman	Kapikanda ...	50	0 3½	0 18	33 35	87 5	233 10	261 6	27 12	Ditto	Do.
17	Kali Kumar Sen ...	Urshiura	50	0 5	0 20	48 16	193 24	338 12	581 2	242 6	Ditto	Do.
18	Krishna Kumar Sen ...	Urshiura	11	0 1¼	0 5	55 0	220 0	385 0	660 0	275 0	Ditto	Do.
19	Pyari Charan De ...	Fulbaria	21	0 1¼	0 3	28 32	74 36	201 9	224 7	22 14	Ditto	Do.
20	Gobinda Chandra Nama.	Masaura	40	0 3	0 15	36 12	181 20	272 4	584 8	312 4	Ditto	Do.
21	Sanatan De	Ramrail	8	0 ½	0 3	30 10	181 20	211 12	544 8	332 12	Ditto	Do.
22	Jogesh Chandra Dhar	Urshiura	95	0 8	1 10	40 30	254 29	285 4	764 3	478 15	Ditto	
23	Surendra Chandra De	Birampur	50	0 5	0 20	48 16	193 24	338 12	580 13	242 1	Ditto	Do.
24	Bancharam Nama ...	Paitar Hata ...	30	0 1	0 3	16 5	48 16	112 14	145 4	32 6	Ditto	Do.
25	Nanda Ram Nama ...	Ditto ...	20	0 2½	0 9	60 20	217 32	423 8	653 7	229 15	Ditto	Do.
26	Nil Madhab Barman	Fulbaria	150	0 8	0 20	25 32	64 21	180 10	193 9	12 15	Ditto	Do.
27	Protap Chandra Sen ...	B. Baria	60	0 2½	0 3	20 6	24 8	141 0	72 10	68 6	Ditto	Loss.
28	Jamini Kumar Barman	Pairtala	60	0 4	0 9	32 10	72 22	225 12	217 10	8 2	Ditto	Do.
29	Bipin Chandra De ...	Medda	40	0 3	0 5	36 12	60 50	253 15	182 4	71 11	Ditto	Do.
30	Joy Dhan De	Senda	25	0 2½	0 5	48 16	96 32	338 13	290 7	48 6	Ditto	Do.
31	Bharat Chandra De ...	Urshiura	12	0 1¼	0 2½	50 26	101 12	354 8	303 15	51 9	Ditto	Do.
32	Bhuban Ch. De ...	Birampur	20	0 2½	0 5	60 20	121 0	423 8	363 0	60 3	Ditto	Do.
33	Atul Chandra De ...	Ramrail	17	0 2½	0 5	71 7	142 14	499 2	426 14	62 4	Ditto	Do.

N. B.—The high yield obtained was due to the whole tubers being used as seed.
The price of seed potato is Rs. 10 for Darjeeling.
Ditto ditto Rs. 7-8 for Nainital.
The market rate of potato is about Rs. 3 per maund.

Potato results—Chandpur.

Serial No.	NAME.	Village.	Length and breadth of the plot.	Quantity of seed.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seeds per acre.	Money value of the yield per acre.	Profit or loss per acre.	Variety of seeds.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Cubits.	M. S.	M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.		
1	Aminuddin	Chinamura ...	48 27	0 20	2 35	7 30	43 5	75 0	86 5	11 5	Darjeeling	Profit.
2	Imanaddin	Do. ...	48 20	0 20	2 20	10 0	50 0	100 0	103 2	3 2	Ditto ...	Do.
3	Asan Kadir Bhuyan ...	Do. ...	56 17	0 20	3 35	10 0	77 20	100 0	155 4	55 4	Ditto ...	Do.
4	Purna Chandra De ...	Do. ...	60 16	0 20	3 35	10 0	77 20	100 0	155 4	55 4	Ditto ...	Do.
5	Kashi Chandra Ray ...	Do. ...	56 17	0 20	5 5	10 0	102 20	100 0	212 8	112 8	Ditto ...	Do.
6	Payari Mohan Ray Chaudhuri.	Do. ...	40 32	0 20	5 12	7 20	80 25	75 0	166 9	89 9	Ditto ...	Do.
7	Umed Ali Pardhania...	Shabarkandi ...	58 23	1 0	8 35	10 0	88 30	100 0	152 11	52 11	Ditto ...	Do.
8	Asad Ali Chaudhuri ...	Fetapur	56 40	1 0	10 3	8 22	86 20	85 11	151 6	65 10	Ditto ...	Do.
9	Asan Karim	Urdamardi ...	40 32	20 0	6 0	7 20	90 0	75 0	157 8	82 8	Ditto ...	Do.
10	Nazar Ali	Chinamara ...	56 17	0 20	7 0	10 0	140 0	100 0	350 0	250 0	Ditto ...	Do.
11	Gafur Ali	Shobandandi ...	114 56	3 0	20 25	9 6	61 35	90 0	108 16	18 16	Ditto ...	Do.
12	Ganni Munshi... ...	Urdamardi ...	120 48	2 0	17 10	6 26	57 20	66 8	100 10	38 2	Ditto ...	Do.
13	Achac Alam Chaudhuri	Damodardi ...	114 56	3 0	31 0	9 0	93 0	90 0	202 12	112 12	Ditto ...	Do.
14	Jatindra Nath Basu...	Bardia	20 16	0 1½	1 20	2 10	90 0	22 8	157 8	135 0	Ditto ...	Do.
15	Surendra Nath Basu...	Do.	20 16	0 2½	1 25	3 30	97 20	37 8	170 10	133 2	Ditto ...	Do.
16	Alimuddin Sirkar ...	Borachar	15 64	0 20	5 5	10 0	102 20	100 0	179 6	79 6	Ditto ...	Do.
17	Madhar Ali	Charmachua ...	40 32	0 20	2 25	7 20	39 15	52 8	68 14	16 6	Ditto ...	Do.
18	Nur Baksh	Shuban Kandi ...	114 56	3 0	20 0	9 0	60 0	90 0	105 0	15 0	Ditto ...	Do.
19	Tarak Chandra Chaudhuri.	Bardia	32 25	0 5	0 10	7 8	45 0	63 12	78 12	15 0	Ditto ...	Do.
20	Amjad Ali Mollah ...	Chinamurah ...	48 27	0 20	2 35	7 20	43 5	75 0	86 5	11 5	Darjeeling	Loss.
21	Raj Kumar Ray Chaudhuri.	Ditto ...	40 40	0 20	2 15	6 0	28 20	60 0	58 0	2 0	Ditto ...	Do.
22	Shashi Kumar Mazumdar.	Naupur	56 40	1 0	2 25	8 22	22 20	85 11	46 10	29 1	Ditto ...	Do.
23	Mohendra Chandra Mazumdar.	Ditto ...	56 17	0 20	1 10	10 0	25 0	100 0	51 9	48 7	Ditto ...	Do.
24	Dukhai Mollah Majumdar.	Basachar ...	15 64	0 20	1 20	10 0	30 0	70 0	52 8	17 8	Ditto ...	Do.
25	Nani Gopal Nag ...	Sashipara ...	49 32	0 20	8 15	6 0	100 20	42 0	207 8	165 8	Nainital	Profit.
26	Mujafar Ali Miyan ...	Nachna	114 56	2 0	12 0	8 16	36 0	42 0	54 0	12 0	Ditto ...	Do.
27	Nabin Chandra De ...	Digaldi	60 17	0 20	0 26½	10 0	16 10	78 0	28 0	41 9	Ditto ...	Loss.
28	Muhammad Ali Baksh	Damodardi ...	56 40	1 5	5 0	9 25	44 11	67 6	77 11	10 5	Ditto ...	Profit.
29	Fazulla	Bhubankandi ...	20 8	0 5	0 15	3 30	45 0	26 4	78 12	52 8	Ditto ...	Do.
30	Ashid Ali	Ditto ...	30 32	0 22	2 32	11 0	56 0	77 0	98 0	21 0	Ditto ...	Do.
31	Mauiruddin	Dhanpaddi ...	56 40	1 0	6 15	8 22	54 25	60 0	95 9	35 9	Ditto ...	Do.
32	Alimaddin Sarkar ...	Bisnupur	20 32	0 10	0 20	7 20	60 0	52 8	105 0	52 8	Ditto ...	Do.
33	Mohendra Chandra Lod.	Ditto ...	40 32	20 0	1 20	7 20	22 20	52 8	38 8	14 0	Ditto ...	Loss.
34	Samsur Ali	Nachna ...	56 40	1 0	4 0	8 22	38 11	60 0	59 4	0 12	Ditto ...	Do.
35	Abbas Khan	Raghu Rampur ...	53 28	1 0	2 25	15 0	19 10	105 0	33 11	71 5	Ditto ...	Do.
36	Samid Bepari ...	Charmachua ...	40 32	0 20	0 35	7 20	13 5	52 8	22 15	29 9	Ditto ...	Do.
37	Karim Baksh Sadagar	Ditto ...	56 17	0 20	1 40	10 0	22 20	70 0	38 8	31 8	Ditto ...	Do.
38	Prasanna Kumar Bepari.	Damodardi ...	160 40	2 17	7 20	7 10	22 20	50 14	38 8	12 6	Ditto ...	Do.
39	Haidar Ali	Charmachua ...	58 33	1 0	1 20	10 0	15 0	70 0	22 8	47 8	Ditto ...	Do.
40	Amjad Ali Mollah ...	Ditto ...	64 15	0 20	1 20	10 0	30 0	70 0	52 8	17 8	Ditto ...	Do.
41	Absadujjama ...	Ditto ...	64 15	0 20	1 10	10 0	25 0	70 0	43 12	26 4	Ditto ...	Do.
42	Mansur Ali ...	Ditto ...	40 32	0 20	1 20	7 20	22 20	52 8	38 8	14 0	Ditto ...	Do.
43	Ibrahim	Ditto ...	58 33	1 0	2 0	10 0	20 0	70 0	35 0	35 0	Ditto ...	Do.
44	Srish Chandra Mazumdar.	Bardia	56 40	1 12	3 0	11 5	25 28	78 0	45 2	32 14	Ditto ...	Do.
45	Chandra Kanta Mazumdar.	Ditto ...	120 48	2 0	2 10	6 26	7 20	46 8	13 2	33 6	Ditto ...	Do.
46	Zabdar Ali Hazi ...	Charmachua ...	40 32	0 20	0 30	7 20	11 10	52 8	19 11	32 13	Ditto ...	Do.
47	Isan Saha	Ditto ...	40 64	1 10	4 0	9 15	30 0	65 10	52 8	13 2	Ditto ...	Do.
48	Abbas Hazi	Ditto ...	70 32	1 0	2 0	8 22	17 5	60 0	29 15	30 1	Ditto ...	Do.

Potato results—Chandpur—*continued.*

Serial No.	NAME.	Village.	Area of the plot.	Quantity of seeds.	Yield of the plot.	Seed rate per acre.	Yield per acre.	Price of seed per acre.	Money value of the yield per acre.	Profit or loss per acre.	Variety of seeds.	REMARKS.
1	2	3	4	5	6	7	8	9	10	11	12	13
			Cubits.	M. S.	M. S.	M. S.	M. S.	Rs. A.	Rs. A.	Rs. A.		
49	Meher Ali Sarkar ...	.....	30 32	0 20	1 0	10 0	20 0	70 0	35 0	35 0	Nainital...	Loss.
50	Biswambar De ...	Digaldi ...	30 32	0 20	0 25	10 0	12 20	70 0	21 14	48 2	Ditto ...	Do.
51	Akram Ali	Shobankardi ...	56 40	1 5	3 14	9 25	24 28	67 6	43 3	24 3	Ditto ...	Do.
52	Akbar Ali	Mabarkdi ...	64 5	0 10	0 35	15 0	52 20	105 0	91 14	13 2	Ditto ...	Do.
53	Maudar Gazi	Shubandardi ...	48 20	0 22½	1 20	11 10	45 0	78 12	78 5	0 7	Ditto ...	Do.
54	Mainuddin	Mabarkdi ...	20 32	0 10	0 18½	7 20	13 35	52 8	24 4	28 4	Ditto ...	Do.
55	Gafar Ali Hazi ...	Shubankardi ...	70 32	1 0	1 20	8 22	22 20	60 0	39 6	20 10	Ditto ...	Do.
56	Mohammad Eshaq ...	Bishnupur ...	30 32	0 20	0 26	10 0	19 20	70 0	38 2	31 14	Ditto ...	Do.
57	Hamid, Sunku ...	Shahankardi ...	30 16	0 10	0 26	10 0	26 0	70 0	45 8	24 8	Ditto ...	Do.
58	Asgar Ali	Ditto ...	58 33	1 0	1 30	10 0	17 20	70 0	30 10	39 6	Ditto ...	Do.
59	Prasanna De	Ditto ...	120 48	2 0	2 10	6 26	7 20	46 8	13 2	33 6	Ditto ...	Do.
60	Abid Ali	Digaldi ...	20 32	10 0	0 16½	7 20	12 15	52 8	21 10	30 14	Ditto ...	Do.
61	Umed Ali Pradhania...	Shahankardi ...	58 33	0 30	1 22½	7 20	15 25	52 8	27 5	24 3	Ditto ...	Do.
62	Alimaddin	Bishnupur ...	40 32	0 25	1 20	9 15	22 20	65 10	39 6	26 4	Ditto ...	Do.
63	Sahid Ali	Shahankardi ...	58 33	1 0	1 20	10 0	15 0	70 0	26 4	43 12	Ditto ...	Do.
64	Hajiullah	Bishnupur ...	40 32	0 25	1 20	9 15	22 20	65 10	39 10	26 0	Ditto ...	Do.
65	Abdul Karim	Ditto ...	20 32	0 10	0 18	7 20	13 20	52 8	23 10	28 14	Ditto ...	Do.
66	Nekbar Ali	Udamaddin ...	30 32	0 20	1 0	10 0	20 0	70 0	35 0	35 0	Ditto ...	Do.
67	Mainuddin	Ditto ...	56 40	1 0	1 2	8 22	9 0	60 0	15 12	44 4	Ditto ...	Do.
68	Azimuddin	Silmandi ...	40 24	0 20	1 5	10 0	22 20	70 0	39 6	30 10	Ditto ...	Do.
69	Mohammad Ali ...	Shahankardi ...	40 24	0 20	0 30	10 0	15 0	70 0	26 4	43 12	Ditto ...	Do.
70	Ajgar Ali Haldar ...	Digaldi ...	58 33	1 0	0 38	10 0	8 20	70 0	14 14	55 2	Ditto ...	Do.
71	Mohar Ali	Damadardi ...	40 32	0 25	1 0	9 15	15 0	65 10	26 4	39 6	Ditto ...	Do.
72	Nazimuddin	Uddamadi ...	20 32	0 10	0 20	7 20	15 0	52 8	18 6	34 2	Ditto ...	Do.
73	Bishambar De ...	Digaldi ...	40 32	0 20	0 26½	7 20	9 37	52 8	18 6	34 2	Ditto ...	Do.
74	Hari Mohan Ray ...	Chandpur ...	30 32	0 20	1 20	10 0	30 0	70 0	52 8	17 8	Ditto ...	Do.
75	Kali Krishna Majumdar.	Bardia ...	58 33	1 0	1 20	10 0	15 0	70 0	26 4	43 12	Ditto ...	Do.
76	Sarat Chandra Som ...	Chandpur ...	30 32	0 20	0 25	10 0	12 20	70 0	21 14	48 2	Ditto ...	Do.
77	Prokash Chandra Sarkar.	Kaziara ...	70 32	1 0	1 20	8 22	13 0	60 0	22 14	37 2	Ditto ...	Do.
78	Bhubaneswar Majumdar.	Bardia ...	58 33	1 0	1 22½	10 0	13 0	70 0	22 14	47 2	Ditto ...	Do.
79	Mundar Ali	Charmachua ...	40 32	0 20	0 35	7 20	13 0	70 0	22 15	29 9	Ditto ...	Do.
80	Amjad Ali Mollah ...	Ditto ...	56 17	0 20	0 26½	10 0	23 10	70 0	40 11	29 5	Ditto ...	Do.
81	Abdul Jalil	Ditto ...	40 32	0 20	0 36½	7 20	13 5	52 8	22 15	29 9	Ditto ...	Do.
82	Jagabandhu Ghosh ...	Bishnupur ...	20 16	0 5	0 5½	7 20	8 4	52 8	22 15	29 9	Ditto ...	Do.
83	Meher Ali	Shahankardi ...	20 32	0 10	0 15	7 20	11 10	52 8	19 11	32 13	Ditto ...	Do.
84	Madbar Ali	Charmachua ...	40 32	0 20	0 36	7 20	13 5	52 8	22 15	29 9	Ditto ...	Do.
85	Alimuddin	Shahankardi ...	20 16	0 5	0 8	7 20	12 0	52 8	21 0	31 8	Ditto ...	Do.
86	Mohendra Chandra Majumdar.	Bardia ...	40 32	0 20	1 20	7 20	22 20	75 0	38 8	36 8	Darjeeling	Do.
87	Hari Mohan Ray ...	Chandpur ...	20 32	0 10	0 15	7 20	11 10	75 0	16 15	58 1	Ditto ...	Do.
88	Narendra Chandra Guha.	Bardia ...	15 64	0 15	1 0	12 0	20 0	100 0	35 0	85 0	Ditto ...	Do.
89	Jabaksha Miyan ...	Nadua ...	40 32	0 20	2 25	7 20	39 10	75 0	68 11	6 5	Ditto ...	Do.
90	Mazaddar Ali Miyan...	Do. ...	40 32	1 0	2 10	7 20	33 30	75 0	49 4	25 12	Ditto ...	Do
91	Achray Anam Choudhuri.	Damadardi ...	120 48	2 0	5 20	6 26	18 16	67 8	30 9	36 15	Ditto ...	Do.

DWIJA DAS DATTA,

Supdt. of Agriculture, Chittagong Division.

ANNUAL REPORT OF THE FIBRE EXPERT TO THE GOVERNMENT OF BENGAL, DACCA, FOR 1914-15.

MANURES FOR JUTE ON ACID RED SOILS IN BENGAL.

LAST year's report described in some detail the experiments which have been in progress in the last four years to investigate the most suitable manures for jute under the respective soil conditions prevailing in different parts of the province. Particular attention was given to the results obtained in acid red soils of which the Dacca Farm is a type and it was shown that the application of lime and bone—in addition of course to the ordinary dressing of cowdung—produced a striking aggregate increase in three years of 13 maunds per acre of jute and 11 maunds per acre of mustard *(rabi* crop), the net value of these increases amounting to no less than Rs. 28 per acre per annum. The following table epitomizes the results :—

EAST SHOOTI PLOTS, DACCA FARM.

Treatment.—30 maunds per acre of slaked lime in March 1912.
12 maunds per acre of ground lime in October 1914.

N.B.—Three crops of jute and two of mustard had been reaped since the first application of lime.

3 maunds per acre of bonemeal in March of the years 1912 and 1913 and in October 1914 in addition to an annual dressing, in March, of cowdung or cake equal to 30 lbs. nitrogen per acre.

—	1912.	1913.	1914. Phosphate applied in October with ground lime.	Total increased crop in 3 years.	Aggregate value per acre of increased crop in 3 years.
	Mds. Srs.	Mds. Srs.	Mds. Srs.	Mds. Srs.	Rs. A. P.
(*a*) Increased yield of jute per acre due to lime applied in 1911 and possibly also to phosphate.	4 22	4 0	4 18	13 0	91 0 0
(*b*) Increased yield of mustard due to lime applied in 1911 and 1914 and to effect of phosphate.	5 16	4 2	1 20	11 0	55 0 0
(*c*) Total increased value of jute and mustard reaped in 3 years—1912, 1913 and 1914.	.....	.....	.....	.....	146 0 0
(*d*) Value of lime and bone applied.	.....	.....	.....	.....	59 0 0
Therefore net aggregate return in 3 years.	.....	.....	.....	.....	87 0 0
Approximate increased net return per acre per annum due to application of phosphate and lime.	.....	.....	.....	.....	29 0 0

In the present season several plots of cultivators' land near the Dacca Farm have been treated with lime and bone in order to test the above results on land which has been under ordinary cultivation for some time. It was necessary to do this because the cultivators' custom of mixing all his household ashes with his manure for application to the land might in the course of time materially modify its reaction in regard to lime. On a Government Farm there is of course plenty of cowdung, but the ashes are lacking. The lime has nevertheless produced an obvious effect on each of the cultivators' plots and the results will probably be as striking as those obtained on the Farm.

In this connection it has been thought worth while to commence a series of plots to decide whether smaller quantities of lime applied oftener would not be as effective or more so than the large quantities at present used. This is an important point because, if 10 maunds per acre would produce approximately the same effect in the first year as 30 maunds, it would involve a considerably less immediate outlay on the part of the cultivator even though the dose might have to be repeated in the 2nd and certainly in the 3rd year. The plots so far seem to indicate that the smaller quantity of lime will produce a well-marked effect which is what is desired.

Application of potash.—In order to further investigate the effect of the household ashes, the use of which is, as has already been pointed out, so common among cultivators, a series of plots has been laid out, some of which have received carbonate of potash or carbonate of soda; while others which are to serve as a basis for comparison have not received either. Judging from appearances the potash has had quite an extraordinarily favourable effect which is obviously much greater than that of the soda. Having regard to the latter and also to the fact that the land had already been limed, it would appear that the action of the potash has been partly that of a specific plant food as well as to help in neutralizing the natural acidity of the soil; in any case the cultivator's action is once more well justified. The Government Agricultural Chemist in Assam has found similar conditions in the acid soils of the Brahmaputra valley and the results obtained at Dacca will probably give ample reason for the continuance of the work.

Investigation of the effect of phosphates on jute.—At Dacca phosphates have shewn no very marked effect in producing an increased height in a jute crop; but, on the other hand, there have been indications that jute grown on phosphated land contains a larger percentage of fibre—a result which would tend equally towards increasing the yield of the crop. Results from other districts as far apart as Rangpur on the one hand and Faridpur and Bhairab on the other also indicate markedly-increased yields from the use of phosphates. The matter will continue to receive attention at Dacca and elsewhere.

It will be seen from the above that considerable knowledge is accumulating regarding the manurial requirements of jute. There are still other points which require investigation, such for instance, as catch crop green-manuring and the application of small quantities of soluble manures as top-dressings to the young crop. Work is in progress regarding the former and the latter has already given decidedly favourable indications. But leaving these aside for the moment there can be no doubt that the information already available, when applied by the cultivator on a large scale, will mean a very considerable increase in the amount of fibre to be obtained from the type of land in question.

Influence of co-operative credit in the development of agriculture.—It is possible that some one who is interested enough to read so far may now enquire how the raiyat with his negligibly small capital is to find the ready money to buy implements, expensive artificial manures, etc. Raiyats, who have been convinced by a field demonstration, have asked the same question in the hearing of the writer of this report and have offered to take a manure if they could be allowed to pay for it with interest, if necessary, after the reaping of the crop to which it was to be applied. The last sentence practically describes one phase of co-operative credit, and it is to this movement and its close association with the Agricultural Department that we have to look for a great deal of the hoped-for improvement in agriculture. Already the cultivator is beginning to realise what co-operative credit means to him; there are now 11 small village banks in the immediate neighbourhood of the Dacca Farm through which the members have bought about 120 maunds of bonemeal in the present season, while 500 maunds have been ordered for next season. In the Bhairab district local banks are the means of supplying very large amounts—approaching 2,000 maunds—of suitable potato seeds to their members, and having found the advice of the Department sound in this respect they are enthusiastic to make other trials. There can be little doubt that this attitude will extend and that in the near future the rate of development of agriculture in this province will be more rapid than appears possible at the present time. A great advantage of the co-operative movement is that any item which a local society may pay attention to—an improved seed-supply, for instance—is immediately brought to the notice of all the members of that society. The financial facilities which the bank affords may not come into play at all in such a case; but merely because it is thus enabled to deal collectively with a body of men instead of isolated

individuals and because the interest of one bank will probably attract attention from neighbouring societies, the chances of the rapid introduction of an improvement by the Agricultural Department are enormously improved.

Selection work on jute varieties.—A résumé was given in last year's report of the work which has been done up to date on the selection of the best races of jute (*C. Capsularis*) and it was stated that enough seed of one or two of the pure line cultures thus obtained would be available to sow 1,000 acres. A considerable quantity of this seed has been sold in the present season, but, owing to the restricted demand consequent on the low prices obtained for the fibre, it was not possible to dispose of the whole stock, as would almost certainly have been the case under normal conditions.

The jute races in question have been selected as the best among a very large number of types procured from every jute-growing district and we know that they are good in every sense. It is of course possible, perhaps even probable, that they are actually the best; but in view of the large area over which jute is grown and the very numerous types to be met with in every district, it would be unwise to make such an assumption. Therefore in pursuance of a deliberate policy of arriving ultimately at the best, test plots have been put down throughout the jute-growing districts in order to compare our selected races with the local ones on the spot. If any local races shew themselves superior in any way they will be investigated next year. On the other hand, with a similar object in view, a very large number of small plots—over 700—have been grown on the Dacca Farm from seed sent in from the districts. Thus with all the information which we shall derive—both from the district plots and from the plots on the Dacca Farm—we hope to advance materially this season towards our goal. The path is no easy one as any one who has attempted experimental cultivation under such circumstances will allow; we have made mistakes in some respects already, but we hope to profit by the experience and avoid them in the future. It is of course possible that one race will not do equally well in all jute-growing districts and we may find it necessary to produce a race for each tract. This will almost certainly be the case in the so-called "Desi" districts where *C. Olitorius* is grown; for the climate over West Bengal differs materially from Eastern and Northern Bengal in the comparative scantiness and lateness of its spring rainfall. Such conditions seem to suit *C. Olitorius* much better, as a rule, than *C. Capsularis* which usually makes heavier crops after early sowing. For this reason a separate scheme of selection for *C. Olitorius* is in progress in the "Desi" districts.

In the meantime multiplication of the seed of the races already at our disposal will be continued, and as cultivators in several places have already signified their preference for our seed, there will be a continually-increasing demand. If we ultimately succeed in finding better races, the distribution of their seed will be easy as the critical difficulty of attracting the attention of the cultivator has now been largely got over.

Assistance from mufassal agencies of jute firms.—In last year's report the suggestion was made that the mufassal agencies of the Calcutta jute firms might be able to render great assistance to the Agricultural Department in testing and introducing improvements in the cultivation of jute in their respective districts. Messrs. Sinclair Murray & Co. have, through Mr. Luke, made a commencement in this direction at Naraingunge in the present season by growing a fine crop of jute from departmental seed as a demonstration. The crop has attracted a considerable amount of attention in the district, and arrangements are being made for further work next season. Messrs. Suttie and Blount have offered facilities not only at Naraingunge, but at other agencies belonging to their firm and there is reason to believe that other Calcutta firms are willing to assist in the same way. Such co-operation between large commercial houses in Calcutta and the Department cannot fail to be of very great mutual value and its inauguration is likely to mark an epoch in the development of agricultural investigations in Bengal, not only in regard to jute, but also other important crops grown in the province.

Heart damage.—An investigation into heart damage of baled jute, which has been proceeding for several years, has been concluded as far as *pucca* bales are concerned. The experiments leave no doubt that only jute which is markedly wet is likely to suffer the damage and an approximate maximum moisture limit has been fixed—beyond which damage is bound to take place. A report is being written and will be presented to Government at once.

Water weeds.—A short time ago the Naraingunge Chamber of Commerce approached the Governor of Bengal on the subject of the growth of water weeds

in the *khals* and *bheels* in the neighbourhood of Naraingunge. At the instance of His Excellency an investigation was commenced and the analyses have shown the plants to be surprisingly rich in plant food, so much so indeed as to constitute them a possibly valuable addition to the manurial resources of the province. This information will be given as much publicity as possible, and it should have a considerable influence in persuading the cultivators to clear the narrower water channels at least. In collaboration with the Deputy Director of Agriculture a scheme has been drawn up for exhaustive practical tests on the Dacca Farm with this material.

In the year under review sanction has been given to an increased scale of pay for the Laboratory Assistant, and to a new appointment, viz., that of Field Assistant, on my staff. Babu Nirmal Chandra Basu, M.S.C., has been appointed Laboratory Assistant and Babu Tara Nath Ray fills the Field Assistant's post.

ROBERT S. FINLOW,

Fibre Expert, Government of Bengal, Dacca.

DACCA;

The 10th August 1915.

OFFICE OF THE AGRICULTURAL CHEMIST TO THE GOVERNMENT OF BENGAL.

Brief report of work done by the Agricultural Chemist to the Government of Bengal, Dacca, during the year ending 30th June 1915.

1. *Charge of Office.*—The Agricultural Chemist held charge of the office throughout the year.

2. *Staff.*—During August 1914, Government sanctioned the following additional staff:—

(*a*) A second assistant on Rs. 125—5—175.

(*b*) A bacteriological assistant on Rs. 100—5—150.

Babu Nirmal Chandra Basu, M.Sc., was appointed to the latter post on the afternoon of 7th December 1914, but the post fell vacant on 4th February 1915, when he was appointed first assistant to the Fibre Expert to the Government of Bengal, Dacca.

Babu Gostabehari Pal, M.Sc., was appointed second assistant on probation, on 19th December 1914, and was confirmed in the appointment three months later.

Mr. B. B. Price, first assistant, retired on medical certificate on 22nd May 1915; but for the previous three months very little assistance was obtained from him.

Babu Gostabehari Pal has now been promoted to first assistant.

Babu Indu Bhusan Chatterjee, L.Ag., has been appointed second assistant and Babu Surendra Nath Bose has received the appointment of bacteriological assistant, but has not yet joined.

3. *Leave.*—The Agricultural Chemist has taken no leave in the year under report.

4. *Tours.*—The following tours were undertaken:—

July.—To Calcutta. To talk over sugar matters with the Manager, Cossipore Sugar Works and inspect some of his experimental sugarcane at Belur, and also to interview the Manager of the Tarpur Sugar Works.

Also some time was spent in looking up Patent Literature.

August.—To Calcutta. By request of the Revenue Secretary to discuss the sugar situation arising out of the outbreak of war.

September to October.—To visit the date-sugar-producing districts with the idea of trying to encourage the production of palm-sugar. From 10th to 22nd September, the following places were visited, every endeavour being made to meet all the touring officers of Khulna, Jessore, 24-Parganas, Howrah, Nadia and Faridpur districts. A note on the possibilities of increased production in each district was submitted to the Director of Agriculture, Bengal, Calcutta.

From 9th to 13th October Bakarganj was visited.

It might be remarked that the tour apparently had a good effect since the Collector of Barisal subsequently informed me that date-sugar production had so much increased in his district that the price of *gur* instead of rising as in other parts of India was actually lower than in previous years.

December.—To Munshiganj. To take samples of the water-supply for examination.

To Chinsura. Chinsura was also visited to select sites for experimental sugarcane plots.

To Belur. Belur was again visited to see the experimental sugarcane there.

January.—To Chittagong. To take soil samples and inspect farm.

To Cox's Bazar. To investigate the possibilities of the *nipa* palm (*nipa fruticans*) for the production of palm-sugar. Samples of the rice and ferment used in making rice beer or *pachwai* were also obtained.

February.—To Chinsura and Belur with the Imperial Sugarcane Expert to shew him the sugarcane work there.

To Rangpur to attend Agricultural Conference and also to tour and take soil samples in the tobacco tract of that district.

To Chinsura to superintend the sowing of sugarcane plots.

March.—To Jessore district to gather information as to whether more palm-sugar work was being made this year; also to obtain various information as to prices.

To Chinsura to inspect sowings of sugarcane.

March—April.—To Coimbatore, Madras Presidency, to examine the students of the Agricultural College there. A tour was made of the palm sugar producing districts of Madras, and visits were paid to various factories. A report on this tour with suggestions for Bengal was furnished to the Director of Agriculture, Bengal.

In all the Agricultural Chemist was on tour for 97 days during the year.

5. *Work performed.*—Owing to the changes in my staff the continuity of various pieces of work has been interfered with. During this last month of the year Mansfield's Oil Gas Plant is being installed. This is expected to give greater facilities for work.

I—Sugarcane.

The work under this head may be divided as follows :—

A—*Continuation of the trial of promising varieties.*—Reference to previous annual reports will shew that, on the Dacca Farm, we have experimented with the following five varieties—Dacca Gandari, Yellow Tanna, Striped Tanna, B147 and B208. Up to date we have found that B147 is the most promising of these. It has a richer juice and yields far more heavily than the local Dacca Gandari. B208 is easily the richest cane in sugar, but it would seem to be rather too soft and delicate for Dacca. It requires to be fenced in, since jackals and pigs are much attracted by it.

Striped Tanna grows luxuriantly, but it has a very impure juice and the thick canes give much trouble in crushing. It has therefore been discarded in the present year's experiments.

Yellow Tanna, though not very rich, is very hardy, and a good yielder and it is still being kept under trial.

No work was done in this laboratory on the canes harvested during the year. These canes included the five varieties above named and also the ratoon canes from the previous year's crop of the same varieties. The canes were very badly diseased, being badly attacked both with red rot and stem borer.

During last March duplicate plots of 1-10th acre each of the following varieties were sown :—

1. Sarethi of Aligarh.
2. Yellow Tanna.
3. Barbadoes 147.
4. Barbadoes 208.
5. Dacca Gandari.

Sarethi of Aligarh is a thin cane which yields remarkably well in the United Provinces. It is being tried to see how such a cane does in these parts. At the time of writing (June 23rd) Sarethi is doing extremely well. B208 appears, however, to be making the best growth, which the writer did not expect. During the recent spell of wet weather B147, which unexpectedly had been quite poor, has been making some headway. Dacca Gandari and Yellow Tanna seem to be doing fairly well.

Our present impressions are —

(*a*) That B147 will turn out a very good cane for introduction into Bengal. It has a richer juice than Dacca Gandari and in our experience

yields more heavily. B147, however, is not suitable for chewing purposes, for which Dacca Gandari is grown, but makes excellent *gur*.

(*b*) That B208, if carefully protected from animals, should produce a large crop of excellent chewing cane, though it is difficult to get the cultivator to admit that it is as sweet and soft as their own Dacca Gandari.

It should be remarked here that one must not depend entirely upon one variety. One must always have other varieties in reserve. With this end in view we are growing this year at Dacca on a small scale the following varieties :—

1. Red Mauritius—a thick cane which does well in South India.
2. Barbadoes 3412, which has also done well in South India.
3. Java from Coimbatore.
4. Java No. 247 from Coimbatore and from the Central Provinces.
5. Java No. 36 from the Central Provinces.
6. Java No. 33A from the United Provinces.
7. Sunnabili from the Central Provinces. This is a thin cane which it is hoped may turn out to be a much better cane than the commonly-grown thin cane Khari.

Disease.—Java 36 and Sarethi have been much attacked by Smut (Ustilago sacchari). Otherwise the canes are fairly healthy.

B—Experiments on drainage of sugarcane.—At Chinsura much land is very low lying and during certain portions of the year is liable to water-logging. During dry periods of the year the canes would probably be much better for irrigation. Four experimental areas have been laid out on the Chinsura Farm.

Two of these areas have been drained with open drains on the Java system. The drains can be filled with water during the dry season and during wet weather they drain off the water.

The remaining two areas have the same varieties of cane growing on them, but they are being grown on the ordinary country system.

The experiment has been largely spoilt, owing to the hopeless germination. The Farm Superintendent puts this down to want of water at sowing time.

Sarethi from Aligarh promises to give a good crop on each plot, but the cane on all the other plots is very poor.

It is as yet too early to say whether the drained plots are likely to turn out better than the undrained ones since the rains at Chinsura have only just commenced.

C—Collection of Bengal varieties.—With the idea of making a survey of the canes growing in Bengal, a beginning was made last year in the collection of these varieties at Dacca. The Dacca Farm soil is not good soil for this work, but the varieties must be grown under constant supervision. Last year 14 varieties were grown.

We again have these same varieties growing this year and in addition have 44 other varieties from the districts of Dacca, Mymensingh, Barisal, Faridpur, Burdwan, Murshidabad, Rajshahi and 24-Parganas.

When the canes are classified we shall doubtless find that canes called by different names in different districts are really the same variety.

Most of these varieties are making good growth.

It is hoped gradually to collect and study all the varieties of cane grown in Bengal.

II—Palm-sugar Investigations.

A—*Field work.*—The seeds sown on the Dacca Farm and mentioned in last year's report germinated fairly well and the young plants are well established.

Government sanctioned the purchase of a small apparatus from America such as is used there for the production of sugar from maple tree sap. Great attention has been paid to improvements in this kind of apparatus in the past few years in America. It was expected that the plant would arrive in time for work in the field last cold weather, but owing to a mistake it was kept back in New York. It is now on its way and it is to be tried next cold weather in Jessore district. It is felt that the only real way to improve the palm-sugar industry is by some form of co-operation. The plant ordered

should deal rapidly with the juice of a large number of trees. Metal collecting buckets for the juice are also being imported.

Further, large gathering tanks are to be tried. These will be filled with juice in distant gardens and transported on a cart or in a boat to the sugar-making house. This should save much labour in transportation.

Another experiment to be tried is the use of lime in the pots in order to prevent the fermentation of the juice. This seems to be very successful in Madras.

Marketing the date gur.—The date *gur* being semi liquid is difficult to cart since it has to be taken in earthen pots. To get out the *gur* the pots are broken and this means expense. To make matters worse, pieces of earthenware get into the filter bags of refineries and cut the cloth and are hence a source of much trouble. It is proposed to attempt to make a more solid product such as the jaggery which is made in Madras. In Madras the jaggery is sent about in gunny bags and it is proposed to try the same system in Bengal. The gunny bags are inexpensive and can be used again many times. This should mean a considerable saving in expenditure on earthen pots.

B—*Laboratory work.*—This is being undertaken in order to elucidate the mechanism of the production of sugar in palm-trees.

Work on Phœnyx sylvestris—The wild-date palm.—The juice of several trees has been submitted to a thorough examination for enzymes, capable of producing changes in starch, various sugars and proteids. No trace of any enzyme has hitherto been found in the juice. This would point to the sugars being produced in the palm tissue by extra cellular enzymes.

Work on Oreodoxa regia—The royal palm.—This is a palm which produces flowering stalks from its main stem. Flowering stems of different ages from the same tree have been removed and a full examination is being made into the amount and kind of carbohydrates present in the flowers of different ages. Enzymic tests have also been carried out.

C—*Work on Nipa palm* (*Nipa fruticans*).—This is a swamp stemless palm growing in various parts of the Sundarbans and at Cox's bazar. Gibbs in the Phillippine Islands has called attention to the possibilities of this palm as a sugar producer and he seems convinced that sugar production from these palms would be a great success commercially. During a visit to Cox's Bazar a number of these palms were seen. The juice was there being used for the production of alcohol. I examined the juice of a number of trees on the spot and brought four samples of preserved juice back with me to Dacca. As the juice was being used for alcohol production no special precautions were being taken to keep it clean. It is distinctly richer than date-palm juice, the canesugar running from 11¼ to 15½ per cent. and the reducing sugar from 0·30 to 1 per cent. in the samples I examined.

At the same time the yield of juice per tree is very small, much smaller than from a date-palm tree and the trees only flower every second year. I do not anticipate much of a future for the *nipa* palm from the sugar-making point of view in India.

III—Soil Survey.

This work mentioned last year has made less progress than was hoped owing to the loss of the 1st assistant.

All analyses which have so far been made of Bengal soils, however, have been collected together. As the work progresses we are finding that by far the larger part of Bengal is extremely deficient in lime. On these areas we are quite safe in recommending liming and the application of bone-meal. Some of the Bengal soils moreover contain a high proportion of magnesia to lime.

During the coming year it is hoped to carry out a detailed examination of the Rangpur tobacco soil tract.

IV—Miscellaneous Investigations.

A—*Enzymes in seeds.*—In last year's report reference was made to the discovery in the sword bean of urease, a ferment converts urea to ammonium carbonate. Work has been done with the object of discovering the significance of the presence of this enzyme, but the experiments are to be repeated before publication.

B—*Pachwai of Rice Beer.*—Samples of the rice and of the ferment used in the making of the beer were obtained personally at Cox's Bazar. Two

distinct types of yeast have been obtained in pure culture from the ferment—one a rapid membrane former, the other a bottom yeast.

C—*Starch estimation.*—A good deal of work has been done on a modification of Davis's method for estimating starch in plant materials.

D.—*A start has been made on the biological analysis of the soils of plots on the Dacca Farm, which have received various kinds of manuring.*

V—ROUTINE WORK.

Various samples of soils, manures and feeding stuffs have been received for analysis. Most of these came from Government farms.

H. E. ANNETT,
Agricultural Chemist to the Government of Bengal, Dacca.

REPORT OF THE ECONOMIC BOTANIST FOR THE YEAR ENDING 30TH JUNE 1915.

THE Economic Botanist continued to hold charge of the office throughout the year under review. There were no changes or additions to the staff.

Tours.—Sixty-four days were spent on tour, chiefly in visits to the various farms in connection with work in progress, and to Noakhali, Tippera and Bikrampur in connection with experiments in checking Ufra paddy disease. Three visits were paid to the Karimganj Farm in Sylhet to inspect the paddy work there. In May 1915 a visit was paid to Kalimpong and neighbourhood to draw up a scheme for fruit growing in the Darjeeling district.

Work.—The following are the main items of work in progress during the year :—

(1) *Rice.*—The work on rice has been continued on the lines indicated in previous reports. The survey of the varieties of transplanted *aman* paddies of East Bengal is almost completed, and several types are now being tested on a practical scale. This work has resulted in the selection of at least one variety which promises to prove superior to any of the local varieties grown round Dacca. During the year a thorough test of the variety was made both on the farm and in the neighbourhood on cultivators' fields. The results are given below :—

	Area.			Average yield per acre.		
I.—Farm—	B.	K.	Ch.	Mds.	Srs.	
(*a*) Darbari Ravine ...	10	12	13	33	5	(2,650 lbs.)
(*b*) South Ravine ...	3	19	5	31	9	(2,498 „)
(*c*) Rakhali Ravine ...	1	5	0	21	32	(1,745 „)
(*d*) Office Ravine ...	1	8	0	35	21	(2,842 „)
Total ...	17	5	2	30	17	(2,434 „)

or 5 acres 15 cottahs.

that is, an area of 5 acres 15 cottahs yielded at the average rate of 30 maunds 17 seers per acre, which was a record for the Dacca Farm. It may be noted that the yields per acre of Darbari and South Ravine in the two previous years (1912-13 and 1913-14) were Darbari, 18 maunds 38 seers and 16 maunds 27 seers ; South Ravine, 24 maunds 1 seer and 16 maunds 17 seers.

II.—Cultivators' plots—

VARIETY.	Area.	Actual outturn.	Outturn per acre.
	Sq ft.	Mds. Srs.	Mds. Srs.
(1) Local Lohadung ...	5,994	2 27	19 17
(2) Indursail selected ...	5,482	4 23	36 14
(3) Local Kartiksinni ...	9,619	4 20	20 15
(4) Indursail selected ...	10,692	7 25	31 2
(5) Local Malloty ...	18,451	8 0	18 35
(6) Indursail selected ...	18,451	11 0	25 38*

* Was a second crop after *aus* paddy.

As regards cooking qualities, the cultivators concerned state it is quite as good as their own local favourite, Malloty, and all admit it is a much heavier yielder. That their interest in this paddy appears genuine, is evidenced by the fact that members of various local co-operative banks have offered to buy the whole stock available for seed, and a large number of demonstration plots are being grown this season. Unfortunately the trials of the paddy at Chinsurah, Rajshahi and Rangpur yielded no result as the paddy crop on these farms last year was a complete failure owing to the short rainfall.

On the more purely scientific side, work on crossing and inheritance of characters has been continued, and some interesting results obtained.

Seed-rate and specific gravity selection experiments.—The experiment of the previous year was repeated. Six plots each $\frac{1}{12}$th acre sown with unselected seed at the local seed rate yielded 10 maunds 32 seers against 9 maunds 19 seers for six selected plots, the seed rates being respectively 45 seers per acre and 33 seers per acre; while six plots sown with light seed rejected from the selected plots yielded 8 maunds 13 seers, the seed rate being 11 seers per acre. Thus while the unselected plots yielded most, the same quantity of seed spread over double the area yielded 17 maunds 22 seers against 10 maunds 32 seers. Taken in conjunction with the previous year's results, these figures, while they leave the advantage in favour of heavy seed somewhat doubtful, prove beyond doubt the great waste of seed at sowing time owing to the high seed rate ordinarily in practice.

Ufra disease.—The experiments to find some means of checking Ufra disease were continued at Chaumahuni and Bikrampur, while a commencement was made with the Imperial Mycologist's experiment at Comilla. The former experiments simply consist of burning thoroughly the stubble left in the field after harvest on an area ordinarily badly infected with *Ufra* and ploughing immediately and continuing to do so at intervals up till sowing time. At Bikrampur, for the second year, no *Ufra* occurred on the experimental plot, while at Chaumahuni one plot was slightly attacked. The Comilla experiment is under the control of the Imperial Mycologist and will be dealt with by him. It is hoped it may also be found possible to combat the pest by growing immune varieties. It is doubtful if there is any variety directly immune, but some varieties seem to escape owing to their ripening early in the season before the attack becomes virulent. One such, at least, is known, and work was started during the year under review to test the extent of its immunity, while a search for other such varieties was also commenced.

Other work.—The work on local pulses, oil-seeds and chillies was continued, and it is proposed to start testing on a practical scale several selected types of each of these crops this season.

Fruit.—The fruit experiments at Dacca were continued. No new varieties were added during the year, and the work done was mostly of a routine nature. Most of the trees in the area are now in bearing. In May 1915 a visit was paid to Kalimpong to draw up a scheme for fruit growing in the Darjeeling district.

Mycology and Entomology.—The Mycological Collector and Entomological Collector continued to work under the Economic Botanist. A separate report on their work is submitted.

G. P. HECTOR,

Economic Botanist, Bengal.

REPORT OF THE IMPERIAL ENTOMOLOGIST.

Memorandum of Insect-pests reported from Bengal during the Agricultural year 1914-15.

1. Letter dated 2nd July 1914, from Messrs. Anderson, Wright & Co., Calcutta, forwarding specimens of a beetle grub received from Mr. J. C. Higgins, Vice-President of the Manipur Durbar. The insects were reported to be doing serious damage to a mulberry plantation of the Durbar. These proved on examination to be the grubs of a Cerambycid beetle (*Coelosterna* sp.). Necessary instructions for checking further damage were issued.

2. Letter dated 22nd July 1914, from J. Malcolm, Esq., Ramnugger Concern, Plassey P. O., Nadia district, forwarding specimens of caterpillars which were destroying his Jute crop. These were found to be the examples of Jute Semi-looper (*Cosmophila sabulifera*). Some remedial measures for checking the pest were recommended.

3. Letter dated 24th July 1914, from Kaviraj Durga Prasad Sen, Calcutta, reporting that fruit and flower plants in his garden at Deogarh were being destroyed by white ants. Necessary instructions for getting rid of the pest were issued to him.

4. Letter dated 22nd October 1914, from the Superintendent, Jalpaiguri Jail, forwarding specimens of two kinds of insects destroying cauliflowers in the Jail gardens and asking for some means of protection against them. The insects responsible for the damage were the large brown cricket (*Brachytrypes portentuosus*) and probably the greasy cutworm (*Agrotis ypsilon*). Some practical suggestions for controlling both the pests were made.

5. Letter dated 10th December 1914, from the Superintendent, Jalpaiguri Jail, forwarding sample of stored rice damaged by insects for examination and suggestion of remedial measures, to keep the stored grains free from the attacks of these pests. *Calandra oryzæ* was found to be the chief culprit, and suitable measures for the protection of the stored grains were recommended.

6. Letter dated 21st December 1914, from Messrs. T. E. Bevan & Co., Calcutta, forwarding a specimen of a "borer-worm" which often occurs in imported pianos. The insect was found to be the grub of a Cerambycid beetle, and to check its further ravages some suitable methods were advised.

7. Letter dated 20th May 1915, from E. G. Macleod, Esq., Kotchandpur, Jessore, forwarding an affected branch from a "Litchi" tree for examination and suggestion of remedial measures to check further damage. The leaves were found to have been infested with a microscopic mite (*Eriophyes*) for the eradication of which certain methods were recommended.

Apart from the above, all the necessary assistance was rendered from here to the Provincial Agricultural Department in the way of identifying insects, preparing and supplying the magic lantern slides of injurious, beneficial and useful insects.

T. B. FLETCHER,

Imperial Entomologist.

REPORT OF THE IMPERIAL MYCOLOGIST.

I HAVE the honour to submit a report on the mycological work done for the Province of Bengal during the year 1914-15 :—

(1) *Ufra disease.*—This constituted by far the most important investigation. The experiment at Comilla unfortunately was not a success and is

being repeated this year. A smaller experiment at Pusa, however, indicated that firing the surface of the soil was a provocative on a small area.

(2) *Betel vine.*—A disease of betel vine, which occurs in the vicinity of Bogra, was found due to a species of Rhizootonia—R.destruens Tass. This disease was investigated and the results are contained in a memoir which is now in the press. The anthracnose of betel vine, which occurs near Shillong, is a different disease the cause of which is obscure.

(3) *Potato.*—The potato blight in India was studied and the results published in a memoir of the Department.

(4) *Areca Palm.*—A disease of this palm occurs in Khulna which was suspected to be due to the attack of Fomes lucidus. This has not so far been confirmed.

F. J. F. SHAW,

Offg. Imperial Mycologist.

ENTOMOLOGICAL REPORT FOR THE YEAR ENDING 30TH JUNE 1915.

DURING the year the Entomological Collector was on leave for two months. He visited the following places in connection with outbreaks of insectpests :—

July.—Uluberia (Howrah).—To investigate the jute semilooper (çosmophila sabulifera, loc. 'Ghora pokā') and demonstrate remedial measures.

August.—Bongong (Jessore).—To investigate the jute semilooper (çosmophila sabulifera, loc. 'Ghora pokā') and demonstrate remedial measures.

Uttarpara (Hooghly).—To investigate the palm-leaf caterpillar (Nephantis serinopa) and demonstrate remedial measures.

Meherpur.—To investigate jute semilooper (çosmophila sabulifera, loc 'Ghora pokā').

September.—Bankura.—To investigate 'Bhapu' disease of paddy.

Uttarpara.—To observe the results of treatment of cocoanut trees attacked by the palm-leaf caterpillar (Nephantis serinopa).

October.—Diamond Harbour.—To investigate a suspected paddy disease.

Midnapore.—To investigate a suspected paddy disease.

November.—Naogaon.—To spray ganja attacked by red spider (Tetranychus sp.).

24-Parganas, Hooghly and Midnapore.—To investigate a suspected paddy disease with the Mycological Collector.

Chanchal (Malda).—To investigate whiteant (Termes sp., loc. 'Ui') on wheat.

March.—Cox's Bazar.—To investigate the palm beetle (Oryctes rhinoceros, loc. 'Bhomra poka').

May.—Borarchar (Dacca).—To investigate the rice stem-borer (Schœnobius bipunctifer, loc. 'Majra') and demonstrate remedial measures.

Muktagacha (Mymensingh).—To investigate the Litchi mite (Phytoptus sp.) and demonstrate remedial measures.

June.—Chaumuhani (Noakhali).—To investigate rice Hispa (Hispa ænesceus, loc. 'Menā pokā') and to examine Ufra experimental paddy plots.

Govindapur (Laksam).—To examine Ufra experimental paddy plots.

Vikrampur (Dacca).—To investigate a suspected paddy disease.

The chief items of work are noted below :—

"*Bhapu*" *disease of paddy.*—The investigation of the disease was continued and it was found to be due to the attack of a fly maggott (most probably Cecidomyia oryzœ). The pest has been described in the Bengali Year Book.

A suspected paddy disease.—This disease, which did serious damage to transplanted paddy in Presidency and Burdwan Divisions, was investigated with the Mycological Collector and a preliminary report was submitted.

The palm-leaf caterpillar (Nephantis serinopa).—This new pest, which did considerable damage to the palm trees in Western Bengal, was studied and a leaflet was published.

The mango weevil.—Experiments started to check the mango weevil by kerosine treatment were continued and the results seem promising.

Red spider on ganja.—Spraying demonstrations of Vermisapon special K. for red spider on ganja at Naogaon were continued.

Observation and treatment of the crop pests on the Dacca Farm.—The most important pests observed on the farm were the following :—

Rice stem-borer (Sçhœnobius bipunctifer, loc. 'Majra').
Rice case worm (Nymphula depunctalis, loc. 'Chonga pokā').
Orange-banded blister beetle (Mylabris pustulata).
Cotton leaf roller (Sylepta derogata).
Mango shoot borer (Alcides sp.).
Mango hairy caterpillar (Cricula trifenestrata, loc. 'Beecha pokā').
The Litchi mite (Phytoptus sp.).
Red-spotted scale (Aspidiotus sp.).
Large brown cricket (Brachytrypes achatinus, loc. 'Urchunga').
Jute semilooper (Cosmophila sabulifera, loc. 'Chhat pokā').
Jute stem weevil (Apion sp.).
Behar hairy caterpillar (Diacrisia obliqua, loc. 'Beechha pokā').
Moth borer (Chilo sp., loc. 'Majra').
White moth borer (Scirpophaga auriflua, loc. 'Sada majra').
Pulse beetle (Bruchus sp.).

To check the ravages of the above insects spraying, hand-picking, fumigation, etc., were resorted to where possible.

Lantern slides.—A set of lantern slides illustrating spraying, bagging, fumigation, etc., was prepared to be shown in exhibitions.

Entomological show-cases.—Show-cases of important insect pests were sent to Bandarkhola (Faridpur), Suri and Feni Exhibitions.

Parcels.—A number of parcels of specimens of insects were received and reported on.

Identification.—A few species of insects were sent to Pusa for identification.

Publications.—The following leaflets were published in English and Bengali :—

(1) The Palm Leaf Caterpillar.
(2) The Palm Beetle.

P. C. SEN,
Entomological Collector.

The 9th July 1915.

MYCOLOGICAL REPORT FOR THE YEAR ENDING THE 30TH JUNE 1915.

I WAS on privilege leave for 38 days. I spent 145 days on tour during the year under report and visited the following places in connection with outbreaks of fungus pests :—

Ranaghat—to investigate cocoanut palm disease.
Bogra—to investigate betel vine (pán) disease.
Uttarpara (Hooghly)—to investigate palm disease.
Bankura—to investigate with the Entomological Collector the *bhapu* disease of paddy.
24-Parganas, Hooghly and Midnapore with the Entomological Collector to investigate a suspected paddy disease.
Rangpur and Mymensingh—to investigate potato disease.

Report on the investigation of each of these diseases was written and submitted to the Director of Agriculture. Remedial measures against those pests, where possible, were suggested to the raiyats.

I also attended the Feni (Noakhali), Banderkhola (Faridpur) and the potato exhibitions at Harinarayanpur (Noakhali) where specimens of more important fungoid parasites were exhibited, life history explained and instructions given to the visitors as to the best method of checking them.

I devoted most of my time supervising experiments in Noakhali, Laksam and Bikrampur to check ufra, dak or thoramara (eelworm) disease of paddy and also visited Comilla to assist in an experiment started there under the direction of the Imperial Mycologist. During the year under report a survey was also started of the ufra or dak infected tracts of the Dacca district. The object of this is to obtain accurate information as to the exact area of country over which the disease occurs, in order to see whether it shows any tendency to spread and in what direction, and to gather information as to the varieties of paddy grown, the method of cultivation, and the general agricultural conditions.

Observation of certain fungus diseases on the Dacca farm crops was also taken and necessary remedial measures were tried.

AMRITA LAL SOM,

Mycological Collector.

THE REPORT OF THE DEPUTY DIRECTOR OF FISHERIES FOR THE YEAR ENDING 30TH JUNE 1915.

This report summarises the work attempted in Bengal and Bihar and Orissa.

Tours.—I was away from Calcutta on tour on 120 days, and fishery surveys were made in the launch at the following places :—

Bengal.

Chagladah.	Diamond Harbour.	Khulna.
Charghatta.	Geonkhally.	Mud Point.
Daulatpur.	Ghatbhog.	Nurpur.

Nynan.

Inspections were made of the fisheries at Rangpur, Dinajpur, Berhampur and in the vicinity of Konnagar. Panchkura was visited with the object of ascertaining whether a suitable site for carp-culture could be obtained there.

Bihar and Orissa.

Arrah.	Cuttack.	Dinapur.
Bankipur.	Delabagh.	Sasaram.
Buxar.	Dehri-on-Sone.	Sone East Bank.

These places were inspected in connection with the establishment and supervision of carp and hilsa hatcheries. We now have carp and hilsa hatcheries both at Cuttack and Buxar. There are also a series of experimental ponds for predatory fish in Bankipur and in Calcutta. Fishery investigations were conducted at Monghyr, and an inspection of the tank at Sambalpur was also made.

Twenty-two days were spent in the Madras Presidency. I inspected the canning factories at Calicut and Beypur, the fish-curing yard at Tanur, the trout hatcheries in the Nilgiri Hills and the sal and carp hatcheries at Kurnool. The chank fisheries at Tuticorin were also visited.

On another occasion I proceeded to Madras in order to attend the second Annual Indian Science Congress.

Seventeen days were also spent on the Chilka Lake with Dr. Annandale, Superintendent of the Indian Museum. On this occasion we were able to secure a launch and to conduct trawling operations over the main channel of the Lake.

Reports of my investigations at every place named have been sent to the Director of Agriculture of each province.

Mr. B. Das, Superintendent of Fisheries, was on tour for 155 days and visited the following places :—

Bengal.

Amta.	Champadanga.	Gopalganj.
Ashuganj.	Chandpur.	Khulna.
Baliakandi.	Dacca.	Kola Beel.
Banjetia.	Damri.	Madaripur.
Barisal.	Damukdea.	Mirkadim.
Basukhally.	Daulatpur.	Narayanganj.
Berhampur.	Falakata.	Panchkura.
Bhandardah Beel.	Ghatbhog.	Pangsa.
Chagladah Beel.	Goalundo.	Saraghat.

Bihar and Orissa.

Bihta.	Jagula.	Kanika.
Dhamra.	Kalibhaug Diara.	Kantiakhai

Khagra (Kissenganj).

The work done by this officer at the above places included the following :—

Surveys of the mud-turtle and mussel-fisheries; distribution of carp fry; attending Agricultural Exhibitions; selecting sites for and conducting fish-cultural operations; general fishery surveys and propaganda work.

Mr. S. M. Mohsin, Superintendent of Fisheries, was on tour for 165 days and visited the following places :—

Bengal.

Amta.	Champadanga.	Ghatal.	Kolaghat.
Burdwan.	Faridpur.	Khulna.	

Bihar and Orissa.

Arrah.	Cuttack.	Kanika.	Muzaffarpur.
Bankipur.	Chaibassa.	Kantiakhai.	Ranchi.
Buxar.	Dhamra.	Monghyr.	Sahibganj.

Sambalpur.

Visits to the places named in Bengal by this officer were made in connection with the distribution of carp-fry and the selection of a site for a hilsa hatchery. This officer also made fishery surveys at Dhamra and vicinity, and at Sahebganj and Barh. He also attended the Agricultural Exhibitions at Chaibassa, Muzaffarpur, Monghyr, Ranchi and Sambalpur, and assisted in the general distribution of carp-fry. In addition, Mr. Mohsin erected hilsa hatcheries at Cuttack and Buxar and conducted experimental hatching operations there under my supervision.

Copies of the fortnightly diaries, and of the inspection reports of the above officers, have, in every case, been submitted to the Director of Agriculture of each province.

Babu Surendra Nath Ghosh has been attached to the Department during the whole year as Zoological Assistant. He was on tour for 165 days and visited the following places :—

Bengal.

Amta.	Diamond Harbour.	Narayanganj.
Berhampur.	Feni.	Nurpur.
Bishnupur.	Geonkhally.	Nynan.
Burdwan	Garhbeta.	Rupasdi.
Champadanga.	Hasnabad.	Suri.
Dacca.	Khulna.	Tangi.
Damera.	Midnapore.	Taki.
Daulatpur.	Mud Point.	

Bihar and Orissa.

Mehsi. | Muzaffarpur.

The work done by this officer at the places named comprised general fishery surveys; attendance at Agricultural Exhibitions; distribution of carp-fry; and inspections of the mussel fisheries.

Publications.—During the year under consideration. the following papers have been prepared :—

I. *Bulletin No. 5.*—Being a report on Fishery Investigations in Bengal and Bihar and Orissa, with recommendation for future work. (Published.)

II. *Bulletin No. 6.*—A report on the Fish Trade in Bengal and Bihar and Orissa for the year ending 31st March 1914. In this report it is shown that the imports of fish to Calcutta are gradually declining. (Published.)

III. *Bulletin No. 7.*—Reports on (*a*) the Mud-turtle and Terrapin fisheries in Bengal (in conjunction with Mr. B. Das, M.A., Superintendent of Fisheries) and (*b*) a report on the fresh-water pearl mussel fisheries in Bengal and Bihar, and the industries connected therewith (with five plates). (Published.)

IV. A paper describing a large number of fish-diseases is in the Press and will be published in the Records of the Indian Museum (Volume XI, Part IV) as contribution No. 2 from the Fishery Laboratory.

V. A report on parasites from fish and aquatic birds in the Chilka Lake is also in the Press and will appear in the Records of the Indian Museum (Volume XI, Part IV) as contribution No. 3 from the Fishery Laboratory.

VI. A report dealing with the fishery rights in the estuaries and rivers, illustrated with coloured maps, is also ready for the Press.

VII. A report, in Bengali, of the work done by this Department during the year ending 30th June 1914, has been prepared by Mr. Das, Superintendent of Fisheries, for inclusion in the Bengali Journal *Krishi Samachar*.

VIII. A brochure, also in Bengali, dealing with the question of stocking tanks with carp fry, has been prepared by the Zoological Assistant. It is hoped to publish this brochure shortly.

IX. A report on the Fish Trade in Bengal and Bihar and Orissa for the year ending 31st March 1915, and papers on artificial cultivation of fish, and on unrecorded fish which eat mosquito larvæ, are also in preparation.

Laboratory work.—A considerable amount of scientific research has been carried out during the year in the Fishery Laboratory in the Indian Museum and also in the Laboratory on board the Fishery Steamer. The work done may be summarised as follows:—

(*a*) A number of larval parasites (Trematode) have been discovered in the skin of various fishes, including rohu.

(*b*) Other larval Trematode parasites have been found in the flesh of various fishes, such as rohu, singhee, etc. In some cases, the infection was so extensive as to render the fish unfit for the market. Infection is particularly heavy in fish obtained from certain beels, and may ultimately impair materially the value of the fisheries in such areas. It is not impossible that certain of these larvæ may become adult in the human intestine.

(*c*) The lice which attack rohu and give rise to epidemic diseases resulting in extensive deaths amongst those fish have been discovered and figured as *Argulus foliaceus*. Linn.

(*d*) A new species of fish-louse living on the bhekti has been figured and described as *Rocinella latis*.

(*e*) The Bombay duck (*Harpodon nehereus*) so common in the lower reaches of the Hooghly during the season were found to be infected with a Cestoda larva. Over 100 parasites were counted in the flesh of a single fish and every specimen caught was infected. The parasite was found to be *Syndesmobothrium folicolle*. The adult worm probably occurs in the intestine of rays and sharks. The parasite does not attack human beings and hence infected Bombay duck can be eaten with impunity.

(*f*) In my last Annual Report I stated that the Forest Officer of Naini Tal had reported to this office the occurrence of a fatal disease which had appeared amongst the trout in the streams and lakes near Naini Tal. The disease was found to be goitre (Carcinoma of the Thyroid).

Full details regarding all the above diseases and others are given in the paper previously referred to, which will be published in the Records of the Indian Museum (Volume XI, Part IV).

In addition to the preceding, extensive research investigations have been made in order to discover most suitable methods for artificially hatching carp and hilsa. Important observations have also been made with reference to the artificial cultivation of the eggs of *Notopterus chitala*.

Propaganda work.—As in past years an extensive system of propaganda work has been undertaken. The new launch recently supplied to the Department has enabled us to visit fishing villages which previously were more or less inaccessible. Our endeavours have always been directed towards giving information relative to the habits of fish generally, how they breed, the manner in which the young fishes develop, the best method of stocking tanks, etc., etc. In every case we have carefully gone into the difficulties which confronted the fishermen. This is labour which does not *appear* to be fruitful. We are convinced, however, that a continuation and extension of the work is most desirable. It enables us to obtain first-hand information relating to the actual condition of the fisheries, and of the circumstances and conditions under which the fishermen labour. It brings to the notice of fishermen the fact that a Fishery Department exists. At nearly all the places visited, we can now rely on the fishermen co-operating in any scheme which may ultimately be evolved for their improvement,

and for the improvement of the fisheries. We, therefore, believe that a continuation of this work will be fruitful in years to come, and so our present endeavours are to be regarded nearly as pioneer efforts.

The difficulties of the fishermen are two-fold. First, they complain *of a growing scarcity of fish.* We believe there is some foundation for *this complaint.* The cause and the remedy need not be considered here. Secondly, they complain of great poverty, and large numbers of fishermen all over the province are accordingly forsaking their vocation for agricultural pursuits. They are indeed poor. Present methods of leasing out fisheries are calculated to make them poorer still. I am convinced that an immense improvement in this direction will be possible by initiating Co-operative Credit Societies. As far as I am aware no improvement is possible by any other means. The number of Co-operative Credit Societies already established amongst fishermen is four. There has been no increase during the year. This is because no endeavours have been made in that direction. It was felt that if Co-operative Credit Societies were merely started with the single object of lending money at a lower rate of interest than the village money-lenders, no useful purpose would be served, and no permanent improvement made. Consequently, a survey was conducted of the fishery rights in the main rivers throughout both provinces, with the object of ascertaining to whom the fishery rights belonged, and where under lease, for how long, and for what amount. It is now proposed establishing Co-operative Credit Societies systematically, having regard to the special needs of each place. The attempt will be made, where practicable, to eliminate the middlemen by leasing out fisheries direct to organised bodies of fishermen. In this way it is hoped and believed that a material and continued improvement will be effected amongst the fishermen.

Agricultural Exhibitions.—The Department attended and had exhibits at the following places:—

Bengal.

Banjetia.	Falakata.	Rupasdi (Tippera).
Beliaknadi.	Feni.	Suri.

Bihar and Orissa.

Bihta.	Khagra (Purnea).	Ranchi.
Chaibassa.	Monghyr.	Sambalpur.

Tirhut.

The exhibits were similar to those of preceding years except that steps were taken to bring to the notice of the public, the products (such as pearl-buttons, earrings, nose-pendants, etc.) manufactured from fresh-water pearl-mussels. The exhibits everywhere aroused the interest of the public.

Hilsa Culture.—The construction of the launch for this Department was completed in February of the current year. It will, therefore, now be possible to utilise this vessel for hilsa investigations during the forthcoming rains. We have already established experimental hilsa-hatcheries at Cuttack and Buxar. Enquiries regarding the breeding habits of hilsa will also be made at other places, and we are now in a position to conduct the enquiries in a thorough and systematic manner.

Culture of Predatory Fish.—Our observations on the habits of certain voracious fish, such as *Notopterus chitala* (chital), *Ophiocephalus marulius* (sal), *Ophiocephalus gachua* (cheng), and *Saccobranchus fossilis*, etc., are by no means complete yet. We have ascertained, however, that the above species of fish breed early in June. They apparently begin to liberate their eggs during the showers of rain which precede the monsoon. The older fry frequently eat the younger brood. We have fortunately been able to gather a good deal of information regarding the breeding habits and the eggs of Chitala which is sure to be of considerable value in due course. In the beels of Eastern Bengal, these fish (particularly singhee) are heavily infected with a *Trematode* larva which occurs in the *flesh.* This circumstance is of some practical importance, inasmuch as the fish are undersized and unfit for the market. The conditions in the beel, under which the fish live, are such as suggest the probability of the infection being of a cumulative nature. Until the life-history of the parasite is known no steps can be taken to check the spread of the disease.

Tank Culture.—The present method of stocking tanks, practised throughout Bengal, is wholly unsatisfactory. The fry used for the purpose

almost invariably consists of several species, and in this way predatory fish continue to be introduced into tanks. The fry sold for the purpose of stocking tanks are so small that they are readily devoured by any voracious fish living in the tanks into which they are introduced. What is required is that the tanks should be stocked with rohu or other carps *only*, and that these should be of such a size as to be either practically immune from the attacks of predatory fish, or able to escape when attacked. By introducing carp *only*, the predatory fish already present in the tanks will gradulaly disappear except the smaller species which breed therein. The Department is doing all possible to effect the improvements desirable, and hopes to be in a position to supply an increasing number of pure carp year by year. During last rains, we purchased several thousands so-called carp-fry and hatched them out in tanks. When the tank was examined some months later, we found that the fry which we had placed therein consisted almost entirely of puntis (*Barbus puntio* and *Barbus ticto*) and other small species of different genera. We discovered later that it is a custom amongst certain of the women-folk to collect small fry from paddy-fields and to sell them as carp-fry, knowing them to be puntis, etc.

Carp Culture.—The principal food-fish of the people of this province consists of the various carps, such as rohu, catla, etc.

Numerous lines of investigation have been pursued from time to time which had for their object an increase in the supply of these fish.

Attempts were first made to induce tank-carp to breed in the tanks. As these experiments failed, river-carp were substituted and they also failed to breed.

The traffic in fish-fry was then organised.

It was recognised, however, from the first that this method was unsatisfactory, but, until the scientific enquiries regarding carp were completed, nothing better could be attempted.

The Department further recognised that, for the permanent and material improvement of the river and tank fisheries, it was essential that pure carp fingerlings should be available in great abundance, and at a cheap rate.

It is true that enormous quantities of fry can be obtained from the rivers during the rains, but as these fry not only consist of carp but of predatory species, the rearing and separation of these fry was found to be a matter of considerable difficulty.

Our researches have shewn that carp eggs can be artificially fertilised. We have now small carp hatcheries at Buxar and Cuttack. The operations are, however, still in the experimental stage, and we cannot at present attempt to meet the public demand from this source.

It is believed, however, that as a result of our experiments at the above stations, we shall be able to decide upon the most suitable methods of artificially fertilising and rearing the eggs of certain carps, and when once this is determined, the establishment of hatcheries of sufficient size, to cope efficiently with the demand for the carp-fry, and to satisfactorily stock the rivers, is but a small step.

Distribution of fry.—As there is a great demand during the rains for eggs and young fish, the Department last year undertook to supply fry at cost price to all applicants. Over five *lakhs* were distributed. Arrangements were made with the various railway authorities, so that persons from the mufassal, who had come to Calcutta to fetch their consignments, were allowed to take the vessels containing the fry into the compartment with them; consignees were thus enabled to exercise necessary care over the fry whilst in transit.

During the current year, notices in English, Bengali, Uriya and Hindi have been printed and distributed, informing the public that fry could be supplied by the Department. Up to the present we have received orders for over two and a quarter *lakhs* of fry. The same arrangements have been made with the various railway authorities this year, as obtained last year

It is to be regretted that we are not in a position at present to supply pure carp-fry in sufficient quantities. Were this possible, a notable improvement in the tank fisheries of this province would be evident in a very few years. We are hoping to be able to supply a limited number this year and to increase the number available every year. Although the industry is unsatisfactory in the particular detailed, we have had ample evidence that by taking interest in the matter, the Department has succeeded in spreading over wide areas important information with reference to tank-culture generally.

Marine and estuarine fisheries.—No opportunity occurred during the year for undertaking any marine work, and it is unfortunate that the resources of the Bay of Bengal still remain un-exploited.

We have already noted that the launch constructed for this Department was completed in February of the current year. Since taking over this boat, the systematic survey of the fisheries in the Sundarbans has been commenced. It is to be remembered, however, that the Sundarbans cover an area of about 5,700 square miles. Up to the present we have only surveyed the Hooghly fisheries from Calcutta to Mud Point, and the river fisheries in the district of Khulna. The area covered has not been more than 200 square miles, and it would obviously be premature to arrive at general conclusions until the investigations are further advanced. During our survey we employed both beam and otter trawls. Every fishing village within the limits named were visited. Our enquiries also extended to the beels, which are so numerous in the district of Khulna. Observations were made with reference to the employment of otters during fishing operations.

As a result of our enquiries we are convinced that trawling—even with small nets—will never be possible in the Sundarbans. Drift-nets are equally unsuitable. The native methods of fishing leave nothing to be desired in point of effectiveness. The difficulty is that the fishermen are so poor that they cannot even afford to buy or make new and better nets. We shall presently explain why this is so. A second difficulty is that, owing to the extensive steamer traffic through the principal water-ways, the fishermen are unable to lay fixed nets and are consequently obliged to work with small nets unsuited to catch the larger species of fish. Numbers of fishermen are taking up agricultural pursuits.

Fishery improvements will undoubtedly necessitate the artificial cultivation of certain species, but it is equally important that Co-operative Credit Societies should be established amongst the fishermen. Such Societies would not only effect an amelioration of the lot of the fishermen, but would do much towards organising the fish trade and placing it on a more satisfactory basis.

The Sundarbans is a tidal area, and as such, the fishery rights should belong to Government. Prescriptive rights have, however, been established over large areas, and instead of free fishing being allowed (as in the Hooghly and other tidal waters), the fisherman has now to pay rent for the privilege of fishing, in addition to being compelled to sell his fish to the lessee at a nominal figure.

The beels I examined in the Khulna district are in reality traps into which large numbers of young fish are carried during the rains, and captured before being mature. Predatory fish breed extensively in the beels, but as we have already seen, many species are so heavily parasitised as to be unfit for market.

Chilka Lake Fisheries.—During the year an inspection was made (along with Dr. Annandale, Superintendent, Indian Museum) of the fisheries in the main channel of the Chilka Lake. We had the use of a steam-launch which was hired from the Rajah of Kalicote by the Museum authorities. The launch was fitted temporarily with an otter-trawl and also with a beam-trawl. The latter was used principally for bringing up samples of the bottom, with the object of furnishing details relating to the food of fishes.

During the whole of our trawling operations, our catches consisted almost entirely of small rays, jelly-fish, and the bony fish (*Tricanthus brevirostris*), which is practically inedible. Only about ten edible fish were actually caught during the whole trip, and of these only one or two were suitable for the Calcutta market.

It is evident therefore that bottom-nets are useless, and that seine-nets or drift-nets are the only appliances suitable for work in the lake. The inference is simple, namely, that the fish in the lake are not bottom-fish.

My investigation of the fisheries near Parachud and Nalbana were fortunately of a more satisfactory nature. In the vicinity of these islands, and during flood, men are appointed to watch for the entry of shoals of fish in the more limited back-water areas. When fish are seen to enter in numbers, the entry is closed by a bamboo network. As the water area recedes, the fish are caught. On the land side of this netted enclosure is a narrow alley-way. Fish endeavouring to regain the open waters enter this alley-way, and are easily captured. The total arrangement is called a

"Jhan". It is an indigenous form of the "Commachio" system of fish-culture, in which fish are allowed to enter an enclosure at high water, and are prevented from returning during low tide.

The "Jhans" may extend over a length of four miles, although the majority are less than one mile in length. They are fairly numerous in the vicinity of Nalbana Island, Parachud and Noapara. The "Jhans" are usually erected in late October and early November, and only remain fixed for about one month. They are then removed as, during that period, all the contained fish have been captured, and no other shoals are available until the following year. The shoals enter the areas in question in search of food, which appears to consist of a small mussel which is extremely abundant at the time of the year when the "Jhans" are fixed. The fish caught are various species of mullet and bhekti. In addition, the fishermen in these areas use seine and drift-nets in which mullets (spp.), bhekti, and hilsa are caught. Hilsa were very abundant during my visit. The fish supply from the lake is derived from the "Jhans" and from the seine and drift-nets. As the depth of the water decreases after the rains are over, the seine and drift-nets are operated in different areas. There is also a daily, but small, change in the place where these nets are laid.

During my visit, the daily output from all the "Jhans" and nets, of good edible fish, well suited for the Calcutta market, was not less than ten maunds. I am not in a position to say whether this amount is available daily, the year round. I should judge not.

It is a fact that the Chilka Lake fisheries have a monthly variation so far as their productivity is concerned. I was repeatedly informed that for the first fortnight after full-moon, fish are increasingly abundant. During the second fortnight the supply gradually decreases.

Certain investigations were made with reference to the tide in the lake, but no definite conclusions were arrived at. It is well known that in many of the Scottish inland lakes there is a "tide" ("seiches"). Its origin is obscure. A similar "tide" appears to exist in the Chilka Lake. In addition, there is the effect produced by the wind acting for several hours in one direction, and the reverse effect on the opposite coast or shore when the wind has died down, or blows from another direction.

I am informed that during last September the bar of the lake suddenly moved about one mile to the north. The oyster supply seems to have been temporarily exhausted.

It is clear, I think, that the permanent denizens of the lake only include such hardy forms as are able to survive the extensive changes which take place in the lake during any year. In the rains (particularly at the north end of the lake) the conditions are practically those of fresh-water and fresh-water fishes, such as boali, etc., occur. Later on, the lake becomes more saline and the general conditions change greatly.

It seems probable that fish like hilsa and mullet only inhabit the lake in numbers when particular conditions are present. Possibly the same is the case with regard to bhekti. If this is so, the fisheries are bound to be of an uncertain and varying value. Our future enquiries will be directed towards ascertaining to what extent the bhekti, hilsa and mullet (and also prawns) occur at other periods of the year.

Investigations into the fishery rights in the estuaries and main rivers.—This enquiry which was commenced last year has been completed. It is to be noted that the fishery rights over large areas in the main rivers are permanently settled. Our object was to obtain details relating to those fishery rights which belong to Government, *i.e.*, to ascertain to whom they are leased, for how long, and for what sum. All the necessary information has been collected and tabulated, and a map has been prepared, indicating in colour, those fisheries which are permanently settled and those which are owned by Government. At present, all Government fisheries are administered by the Collector of the district in which the fisheries are situated. This Department has no control over any of the fisheries in either province.

The following results were arrived at:—

(*i*) The fisheries of the open sea (*i.e.*, those beyond the three miles limit) are, of course, open to be exploited by anyone.

(*ii*) At present, Government apparently prefers *not* to exercise control with reference to the fisheries situated within the three miles limit. The foreshore fisheries at Balasore, over a length of 15 miles, belong to the Ordnance Department, and a further adjoining portion is apparently privately owned.

The foreshore fisheries in the vicinity of Dhamra are also privately owned. As far as I am aware, no steps have been taken by Government to control the remaining foreshore fisheries.

(*iii*) In tidal waters the fishery rights belong to the public, Government being the Public Trustee. In the Jessore district, however, Government has waived its claim to the fisheries and over large areas in the Sundarbans, proprietary rights are claimed. Possibly in some cases this circumstance has arisen owing to waterways having changed their course, and commenced and continued to flow over permanently-settled estates. In other cases it appears that the establishment of proprietary rights has been due to the entire absence of any form of Government administration over long periods of time.

The result is that not only has a large potential revenue been lost to Government, but the fisherman has also lost his right to fish. Where prescriptive rights are claimed, the fisherman has to pay rent, and is further obliged (in the majority of cases) to sell his catch to the proprietor, or the lessee, at a ludicrously low figure. This is one reason why fishermen are poor, and why they are forsaking their calling.

Under conditions such as these it is extremely difficult to effect any improvement.

(*iv*) The fishery rights in the main rivers are partly owned by Government, but in many cases they are permanently settled. In some districts, portions of Government fisheries are for some reason or other, not farmed. In other cases, no one appears to know whether the rights belong to Government or not. Both permanently-settled fisheries and Government fisheries are, however, usually leased out. The lessee re-leases in small lots, and, as in the case of estuarine fisheries, the fisherman has not only to pay for the privilege of fishing, but he is almost always obliged to sell his fish to the lessee at a low figure. It is clear that the system of re-leasing and sub-leasing partly accounts for the poverty of fisherman, and also partly explains why the price of fish is high. If bodies of fishermen could be induced to take leases direct, a great improvement could be effected. I believe this is possible under a system of co-operation, and one object of the survey was to obtain a list of river fisheries owned by Government in the hope of being able to systematically initiate such Co-operative Credit Societies. If eventually found successful so far as Government fisheries are concerned, operations could be extended so as to include permanently-settled estates. We are now in a position to undertake their establishment at suitable places and to adapt them so as to meet the particular requirements of each place.

Enquiries into the Fresh-water Pearl-mussel fisheries.—During the year a careful inspection of these fisheries has been made. Our results are embodied in Bulletin No. 7. The mussel-fisheries are of importance, because they yield a fair harvest of pearls. The small shells are also utilised in the manufacture of lime, and the large shells are used for making pearl-buttons and ornaments.

The circumstances are such that it has been found impossible to determine the value and extent of the fisheries, but our investigations have shewn that they are of considerable importance. Button-making is a domestic industry over large areas in Eastern Bengal, particularly in the Dacca district. Ornaments, such as earrings, nose-pendants, watch-chains, studs and cuff-links are also made on a smaller scale. There is a button-making factory in Bihar and Orissa, where modern machinery is employed.

The shells utilised for the manufacture of buttons and ornaments belong to the genera *Parreysia* and *Lamellidens*.

Mussels have been fished in Bengal, principally for pearls, for a very long time. Until lately the shells were burnt for lime. Button-making is a modern industry in this province dating back only about 35 years. It reached its zenith during the height of the "Swadeshi" movement, and has since gradually declined. Twenty or thirty years ago the mussel-fisheries in the Bhandardah beel (district Murshidabad) were of an extensive nature, giving temporary employment to large numbers of fishermen from neighbouring villages. It is said that about 50,000 maunds of shells were sometimes fished in one season. At the present time the fishery is of very small extent and barely provides temporary employment for the fifteen families who reside on the banks of the beel.

Mussels are to be found in most of the smaller rivers in Bengal and Bihar and Orissa, and also in *khals* and even in tanks, but there appears to be little doubt that the supply is diminishing. Our enquiries have been devoted

towards determining the factors which react so adversely on these fisheries and on enquiring into the habits and life-history of the mussel.

The female mussel lays eggs which pass immediately to the gills of the animal, where they are fertilised with milt from the male which is carried there by slight movements of the water. The fertilised eggs remain in the gills for some time, the exact period has yet to be determined for each species of mussel. After development has proceeded to a certain stage, a larva (known as a Glochidium) appears. This larva, which has two minute *shells* and a *hook*, is then liberated into the water and attaches itself to the fins of certain fish until it becomes a young mussel. It then drops off the fish and commences life on its own. We found large numbers of Glochidia attached to the fins of an *Ophiocephalus marulius* caught in Eastern Bengal in early June of this year. No doubt other fish are implicated, but this has yet to be determined. Large numbers of young mussels (measuring 1·5 mm.) were taken in bottom tow-nets at Buxar on 16th June. Our knowledge of the life-history of these mussels is thus increasing. It is clear that the welfare of the mussel-beds is intimately connected with the presence, in sufficient numbers, of certain fish. Any decrease in the occurrence of these fish means that the larval mussels cannot complete their life-history, and are thus lost.

The value of buttons (of all kinds) imported into this country from Austria-Hungary and Germany alone during the year ending March 1914 amounted to Rs. 4,06,214. It is clear that there are great possibilities of improving the mussel-fisheries in Bengal. Unless improvements can be effected, the button and ornament-making industries will probably cease to exist. The development of these industries depends largely on suitable shells being available in sufficient quantities. Until we have completed our investigations into the habits and life-history of the mussel, it would be useless to attempt to cultivate them.

The larval parasite round which pearls are formed has not been described yet.

Enquiries into the Turtle-fisheries.—During the year Mr. Das, Superintendent of Fisheries, and myself conducted a preliminary enquiry into the Terrapin and mud-turtle fisheries in Bengal. The results of our enquiries were published, along with a report on the fresh-water pearl-mussels, as Bulletin No. 7.

In Bengal, the industry of turtle-fishing is located principally in the districts of Bakarganj, Khulna and Faridpur. Turtle-fishing is also carried on at Rajmahal in Bihar. In our report, we detailed the places where such fisheries exist; the species fished were described, as were also the various methods of capture. It was found impossible to collect reliable detail relative to the total number of turtles fished per annum, either at any one place, or in Bengal generally, and thus we were unable to estimate accurately either the value of the fisheries or the number of men and boats employed.

Our investigations, however, indicated that the total catches per annum were *not less than 70,000 turtles of all species, having a wholesale value of* about Rs. 42,000 *and a probable retail value of nearly double that amount.*

In consequence of the cruel manner in which the transport of turtles was effected, the various railways have ceased to carry turtles over their lines from 1st September 1914. This action on the part of the railway authorities has somewhat crippled the industry so far as the imports to Calcutta are concerned.

Certain species of turtles are eaten by the Chinese in Calcutta and they are also allowable as clean food amongst the Hindus. Amongst the Muhammadans the consumption of turtles is not definitely forbidden, but they are rarely eaten except amongst the Hanifi sect.

There does not appear to be any scarcity of turtles in the waterways of Bengal. Improvements in the industry appear to depend chiefly on methods being devised for exporting large numbers cheaply, and without unnecessary cruelty

Fish Traffic.—The first statistics collected by this Department related to the year ending 31st March 1913, and these were published in Bulletin No. 4. During the current year we collected statistics relating to the traffic for the year ending 31st March 1914. The imports of Calcutta both by railways and canals shewed a decrease, the total decrease being roughly 40,000 maunds. The quantity of fresh fish imported to Calcutta per annum from all sources, for the years 1913 and 1914, was 203,929 maunds and 163,613 maunds

respectively. The following table serves to emphasise the general inadequacy of supply:—

	Population.	Total quantity of fish available per annum.	Value.	Average quantity available per head per annum.
		Mds.	£.	Mds. lb. oz.
England and Wales ...	35,000,000	21,966,720	10,009,900	·63=50 0
Calcutta	900,000	163,613	109,075*	·18=14 8

It is thus clear that, other things being equal, the supply of fish over the whole of England and Wales is three and-a-half times what is available in Calcutta.

The statistics collected up to the present with reference to the traffic for the year ending 31st March 1915 are incomplete, but there is unfortunately evidence of a further decrease from all sources.

With reference to the fish traffic through the canals, we have been able to collect statistics covering the last ten years. The imports to Calcutta *viâ* canals for the years 1905 and 1915 were 53,000 maunds and 41,000 maunds respectively. The *total* fish traffic through the canals for the year 1906 was 149,522 maunds, whilst for the year 1915 it only amounted to 52,264 maunds.

This decrease is very remarkable and is probably in part due to the development of the inland trade, and to the increasing use which is being made of the railway facilities in various parts of the area in question. Fish is probably scarcer now than it was ten years ago. Further, a contributing cause is the fact that numbers of fishermen have forsaken their calling in favour of the more lucrative agricultural pursuits.

Remarks.—It will be seen from this report that the work of the Department has covered a wide field.

The question of a sufficient fish supply, at a reasonably cheap rate, is a burning question in this province. There is no longer any room for doubt that the present supply is inadequate and the price high.

It is quite a mistake to assume that the rivers and waterways are "full of fish."

The deterioration of the fisheries has been in progress for many years. Our enquiries have led us to the belief that this has been due principally to the following causes:—

(*i*) *The initiation of various irrigation schemes, owing to which both mature fish and fry migrate in large numbers into channels where they are easily caught.*—The irrigation projects which originated in the Sone and Mahanuddy have permanently damaged, if not entirely ruined, the fisheries in these large rivers.

The ill effects of the systems of irrigations on the fisheries of this province are the more keenly felt on account of the fact that, owing to the low-lying nature of the plains, vast numbers of fishes, eggs and fry find their way into the paddy-fields and are lost.

(*ii*) *The lack of suitable administration, and of protective measures.*—No care has ever been taken of the fisheries. The resources have been continuously drawn upon until it is now clear that nature is incapable of meeting the demand. This result was predicted by Dr. Francis Day in the year 1879.

In most countries protective measures have been found necessary in order to save the fisheries from absolute depletion. The unrestrained capacity of man has everywhere proved harmful.

Until recently, the only interest which Government took in the fisheries was limited to the leasing out of the fishery rights and, as we have already seen, this work was done—and is still done—by the Collector of the district in which the fisheries are situated.

Undoubtedly there are other causes which have operated adversely on the fisheries, but we need not detail them here.

As a result of the permanent settlement, a large portion of the freshwater fisheries in this province are owned by private individuals, and these owners thus share with Government the responsibility of taking steps to

improve the present condition of the fisheries and of the fishermen. The Fishery Department has no control whatever over any of the fisheries in either provinces.

Whatever the causes have been which have so impoverished the fisheries, it is certain the process of repair will occupy a much longer period than has been occupied by the process of deterioration. Practical results, however much desired, are rarely easy of realization. The highly satisfactory operations in western countries have only been achieved, at great expense, by large numbers of trained men working over long periods of time.

In Bengal the Department is a young one. The magnitude of the task before the Department is fully recognized. Our energies may be said to have been directed—up to the present—to familiarising ourselves with the nature and extent of the problems with which we have to deal, and in this connection regard should be had to the enormous area, over which our work is spread, to the limited staff available and to the nature of the training these officers received for their work. We are now devoting ourselves to the task of actually increasing the number of fish available in the rivers and waterways by artificially cultivating the principal fresh-water species, such as rohu and catla. Operations of this character require to be carried out on an enormous scale. But the way has first to be found, and during the year a good deal of scientific research has been devoted successfully to this end. We have now every reason to believe that in the course of the next few years we shall make satisfactory progress towards stocking adequately the main rivers, and improving materially the culture of fish in tanks. Similar improvement may also be expected with reference to hilsa. Considerable scientific research will, however, be necessary before we are able to take up the artificial cultivation of bhekti and topsi, etc. An increase in the quantity of fish available will undoubtedly tend to reduce prices. The proposed extension of Co-operative Credit Societies amongst fishermen, by excluding large numbers of middlemen, will, it is hoped, have a similar effect, and will further improve directly the status of the fishermen.

The exploitation of the marine fisheries would at once effect a radical improvement in the fish supply, and it is to be regretted that, up to the present, enterprise in this direction is lacking.

With the new launch which has been supplied to the Department during the year, a survey of the Sundarbans fisheries is being systematically carried on, but it will be some considerable time before the investigations can be completed. During this survey researches are also being conducted into the habits of the principal estuarine fish, such as bhekti and topsi.

The preliminary enquiries into the fisheries of Bengal and Bihar and Orissa which have been made by the Department, although not markedly fruitful in results, have nevertheless been absolutely necessary. Now that these enquiries are completed, the entire efforts of the Department are being devoted entirely to the scientific cultivation of the principal marketable fish, and in this connection we have reason to confidently expect that our endeavours will be increasingly successful year by year.

T. SOUTHWELL, A.R.C.Sc. (LOND.) F.L.S., F.Z.S.,

Deputy Director of Fisheries, Bengal, and Bihar and Orissa

CALCUTTA,

The 1st July 1915.

ANNUAL REPORT ON SERICULTURAL OPERATIONS, BENGAL, DURING THE YEAR ENDING 30TH JUNE 1915.

THE general control and the management of the sericultural operations in Bengal were vested with the Bengal Silk Committee, consisting of the Director of Agriculture, Bengal (President), the Collector of Murshidabad, and two representatives of Messrs. Anderson, Wright and Company and the Hon'ble Mr. G. H. C. Ariff of the two principal silk concerns in Bengal. During the year under review, the Committee held four regular meetings attended also by visitors, who are interested in the silk industry.

Administration.—Babu A. C. Ghose, the Superintendent, remained in charge during the year, with a few Nursery Superintendents and Assistant Superintendents, who were left in charge of the Central Nurseries after some practical training had been given to them under the Nursery Superintendents.

The Piasbari and Amriti Central Nurseries are under the direct supervision of the Superintendent of Sericulture, Bengal, himself.

Mr. Probhat Chandra Chowdhary, in addition to his own duties as Superintendent of the Berhampore Central Nursery, is in charge of the cross-breeding experiments, since Mr. E. Grangeon's leaving India.

The Government has also sanctioned an experimental station at 5, Alipore Road, Calcutta, and the work has been started during the year under review.

Disinfection of village rearing houses.

This is a work which was started by the Superintendent of Sericulture, Bengal, since the year 1910. Supervisors on Rs. 25 per mensem were at first employed to disinfect the village rearers' rearing houses, and all the furniture used in them by strong copper-sulphate solution and to fumigate by sulphur where nursery seed was being reared and some good results were obtained; but this work has since been placed under the direct continual supervision of Assistant Superintendents and occasional supervision of the Nursery Superintendents. Adopting this method of supervision, the outturns, in many cases sold by the rearers very successfully as seed cocoons, and the results obtained thereby everywhere have been very successful. The Collector of Malda, Mr. Johnston, I.C.S., writes on the 31st May 1915 as follows:—

"I paid a short visit to the Piasbari Central Nursery on Saturday, 29th May. Babu A. C. Ghose, Sericultural Superintendent, Bengal, very kindly accompanied me and explained to me the various processes of silk-worm rearing. I was very pleased with what I saw, and in particular with the thorough manner in which the rearing houses had been disinfected and prepared to receive the next crop. The land attached to the nursery was originally jungle and swamp, but the work of cleaning the jungle is almost completed and the work of raising the low lands and spreading of silt from the tanks and digging up the mulberry lands are going on.

The seed raised in this nursery is of good quality, and I have since discovered that it is very much appreciated by the silk-worm rearers in the district who have purchased it, as the outturn it produces is about a hundredfold or more than double that of ordinary village seed."

Scheme for providing the whole quantity of silk worm seed cocoons required for the Province of Bengal.

It was at first proposed that the whole quantity of seed necessary for the Province should be reared in Government nurseries; but it has since been proposed that only one-third of the amount necessary should be reared in this way and that the remaining two-thirds should be reared by professional rearers working under the supervision of Government officers.

In order to make an estimate of the quantity of seed necessary for the whole Province, a census of mulberry was taken.

From the actual sale of seed-cocoons from the Berhampore Central Nursery (containing seven rearing houses and 66 bighas of mulberry lands), it has been found that it produced 3,918 kahans, but sold as seed-cocoons up to 3,022 kahans per annum and the rest was produced for reeling purpose, during August and November, when the rearers do not require seed at all,

and are reared in the nursery only to utilize the mulberry leaves to meet the expenses.

In foreign countries, such as France, Italy, Japan and China, Government in no case ever attempted to supply the entire quantity of seed, and the principal quantity is supplied through selected professional rearers, rearing under Government supervision, and the same is being followed slowly in Bengal as well.

The Assistant Superintendents and the Supervisors are supervising the disinfection of rearing houses, the furniture used in them, the rearing and daily cleaning of the litter of the worms, etc., and giving verbal instructions to the rearers and specially at the last stage of the worms, during the spinning time, they see that in case at any time any of those selected rearers' worms be attacked by muscardine, grasserie or flacherie due to bad rearing, they are never sold as seed, while each Nursery Superintendent also supervises occasionally.

Tour.—The Superintendent inspected the central nurseries as much as possible and spent 295 days on tour.

Inspection.—The Director of Agriculture, Bengal, inspected the nurseries four times and the village rearing houses twice.

Present condition of Silk Industry in Bengal.

The silk market had risen in July 1914 from Rs. 18 to Rs. 21 per seer which was never heard of within the last 16 years in Bengal, but suddenly the market came down to Rs. 9 to Rs. 11 per seer during September 1914, and since last March it is Rs. 10 to Rs. 13 per seer. Owing to the sudden fall of the silk market, the rearers suffered much loss, and the result is that in all the silk-producing districts there has been a slight decrease of mulberry cultivation.

Central Nurseries.

The following central nurseries existed on the 1st July 1914—

(1) Piasbari Central Nursery.
(2) Mirganj Central Nursery.
(3) Berhampur Central Nursery.
(4) Kumarpur Central Nursery.
(5) Chandanpur Central Nursery.
(6) Kalitha Central Nursery.
(7) Bogra Nursery.

Of the above nurseries, Piasbari began rearing from September 1914 the first time, and another central nursery at Amriti has just been completed.

And thus the following central nurseries existed on the 30th June 1915:—

(1) Berhampore Central Nursery	...	(Containing 7 rearing houses and 66 bighas 3 cottahs of mulberry land).
(2) Piasbari Central Nursery	...	(Containing 5 rearing houses and 56 bighas 16 cottahs and 6 chattaks of mulberry land).
(3) Mirganj Central Nursery	...	(Containing 6 rearing houses and 58 bighas of mulberry land).
(4) Kumarpur Central Nursery	...	(Containing 3 rearing houses and 35 bighas 6 cottahs of mulberry land).
(5) Chandanpur Central Nursery	...	(Containing 3 rearing houses and 29 bighas of mulberry land).
(6) Kalitha Central Nursery	...	(Containing 4 rearing houses and 51 bighas of mulberry land).
(7) Amriti Central Nursery	...	(Containing 4 rearing houses and 80 bighas of mulberry land, of which 60 bighas were planted by a contractor which are full of gaps, to be filled up by him during this rainy season).

(8) Bogra Nursery ... ... (Containing 5 small rearing houses and 28 bighas 6 Cottahs and 11 chattaks of mulberry land).

At Amriti no rearing work has been commenced as yet.

Of the above nurseries, only the Berhampore Central Nursery was in full working order and all the rest were under extension, and the following houses were built there with extension of mulberry lands noted against each of them :—

Piasbari Central Nursery	...	1 Assistant's quarters and 7 bighas 13 cottahs and 10 chattaks of mulberry land.
Bogra Nursery ...	...	1 Store-house. 1 Rearing house. 1 Dalla and chandrakee shed, and 3 bighas 18 cottahs and 15 chattaks of mulberry land.
Chandanpur Central Nursery	...	1 Rearing house.
Kumarpur Central Nursery	...	1 Rearing house. 1 Seed-cutting house and 13 bighas and 6 cottahs of mulberry land.

Interchange of seed between the Nurseries.

The Bogra Nursery has been started to purify and supply pure Chhotopoloo seed only by selection, generation after generation, to all the central nurseries, while Piasbari Central Nursery has been started to purify Nistari seed by selection, generation after generation, by microscopic examinations and supply to all the central nurseries, and Berhampore and Mirganj Central Nurseries are supplying Nistari seed to Piasbari Central Nursery.

At the very commencement of the policy of starting small nurseries, a small quantity of seed used to be reared by the Superintendent in his own private quarters, but while more small nurseries were established in 1904, seed had to be imported from villages, which was most unsatisfactory for want of nurseries at Bogra and Malda, which were not started during the time of the Eastern Bengal and Assam Government.

With the starting of the above nurseries the practice of using ordinary village seed was stopped, and since then the keeping up and interchange of seed has effected a very great improvement towards the success of supply of pure seed from the nurseries.

Supply of Nistari and Chhotopoloo seed.

Seed pure and free from all diseases was always reared in all the central nurseries and sold to the rearers from which the rearers everywhere obtained successful results, and in many cases the outturns in the rearers' houses were sold as seed-cocoons.

The total quantity of seed sold during the year was 8,145 kahans 6 pons and 1 gonda, and the price obtained thereof was Rs. 10,170-4-6.

The total receipt from the outturn of the nurseries from 1st July 1914 to 30th June 1915 was as shown below :—

		Rs.	A.	P.
Sale-proceeds of seed cocoons	... ...	10,170	4	6
Ditto cocoons ...	... ...	2,012	5	3
Ditto rejected cocoons	... ...	71	2	3
Ditto mulberry leaves	... ...	707	1	0
Ditto miscellaneous articles	...	108	4	9
Total	...	13,069	1	9

If compared with the total receipts of the last two years, it would appear that there has been an encouraging increase, owing to the starting of Piasbari Central Nursery under close supervision of the Superintendent

himself, which began rearing seed from September 1914, the first time during the year under review, as shown below :—

	Rs.	A.	P.
1912-1913	8,589	10	0
1913-1914	8,324	3	0
1914-1915	13,069	1	9

The details of the year under review are shown separately of each central nursery as stated below :—

Name of Nursery.	Outturn.																	
	Seed.			Cocoons.			Rejected cocoons.			Mulberry leaves.		Miscellaneous articles.			Total price.		
	Ks.	P.	G.	Ks.	P.	G.	Ks.	P.	G.	Rs.	A.	Rs.	A.	P.	Rs.	A.	P.
Berhampore Central Nursery.	2,145	0	15½	895	9	10	29	2	5	335	8	39	9	0	3,603	13	6
Piasbari Central Nursery.	2,408	12	9	78	12	0	24	0	0	...		21	5	6	3,684	2	9
Mirganj Central Nursery.	1,507	12	14	726	11	0	114	6	0	...		13	8	0	2,566	13	6
Chandanpur Central Nursery.	827	6	3¼	292	4	0	46	0	0	272	0	14	1	3	1,424	4	3
Kumarpur Central Nursery.	633	15	11	229	0	0	16	4	0	99	9	7	1	0	956	3	3
Kalitha Central Nursery.	622	6	8¼	208	0	0	21	0	0	...		12	12	0	833	12	6
Total ...	8,145	6	1	2,430	4	10	250	12	5	707	1	108	4	9	13,069	1	9

From the above it seems that the Piasbari Central Nursery has produced the biggest quantity of seed-cocoons in ten months and the sale-proceeds are much higher than all the Central Nurseries, which is most encouraging.

The reasons for the smallest quantity of production of seed-cocoons from the Kalitha Central Nursery is due to bad mulberry owing to excessive rains and fall of big hail-stones in two crops, and also owing to about 25 bighas of mulberry lands in which too much limestone has come out of the soil, which will shortly be given up. Kalitha is a hilly place situated in the Birbhum district. Cyclones and fall of hail-stones are too heavy there.

Expenditure.—The total expenditure of the Nurseries, including the office establishment from 1st July 1914 to 30th June 1915, was as shown below :—

	Rs.	A.	P.
Salaries	5,080	0	0
Travelling allowance of the Superintendent ...	1,906	14	0
Pay of establishment	18,905	10	1
Travelling allowance of establishment ...	3,427	12	3
Stipends	290	6	6
Petty construction and repairs	34,483	9	11
Cost of land	770	15	0
Rates, rents and taxes	1,972	8	11
Rewards to nurserymen	370	0	0
Cultivation charges	35,592	3	4
Disinfection of village rearing houses ...	1,300	11	6
Cost of microscopes	692	7	6
Miscellaneous charges	19,932	6	5
Total ...	1,24,725	9	5

Training of Rearers' sons.

Six professional rearers' sons have been trained, of whom two students passed the final examination from the Berhampore Central Nursery Sericultural class, and was paid Rs. 250 each as reward. They have constructed model rearing houses and have just started the rearing, for which they were also provided with wire-nets, thread-nets and two miscroscopes.

A. C. Ghose,

Superintendent of Sericulture, Bengal.

REPORT ON THE WORK DONE AT THE SERICULTURAL RESEARCH AND CROSS-BREEDING STATION AT BERHAMPORE, DURING THE YEAR ENDING 30TH JUNE 1915.

EVER since Monsieur E. Grangeon's departure for the front in France in August last, I have been conducting his researches on the amelioration of indigenous races by cross-breeding and other experiments. These may be divided into the following three main divisions :—

(1) Crosses of indigenous races with the Multivoltin Madagascar race in various mixture of blood.
(2) Crosses of indigenous races with the Accidental Bivoltin race derived from a pure Univoltin race.
(3) Improvements of indigenous breeds by the method of selection and rearing by families.

The characters chosen for experiments are—

(1) colour and shape of cocoons ;
(2) larval markings ;
(3) size of worms ;
(4) hardiness of the breed as regards resistance to diseases, climatic conditions and the food-stuffs ;
(5) quality of the cocoon and the yield of silk ; and
(6) brood character.

A.—Crosses of indigenous races with the Multivoltin Madagascar race.

The Madagascar race is a Multivoltin race of pure European extraction and yields five generations yearly against silkworms going up to eight generations in Bengal. The latitude of the Madagascar is the same as that of Bengal, but the Madagascar is at a higher altitude. The cocoons derived from pure Madagascar is almost as good as Piedmont and Cevennes. To preserve the Madagascar race in Bengal as a pure race is not of much practical utility, as the race suffers much from flacherie and grasserie during the months of May to July in this country. Besides, the worms of this race are very big and the Bengal rearers are against rearing any race yielding such big worms. Monsieur E. Grangeon made a considerable number of crossings between the indigenous races and the Madagascar race in all possible combinations, in order to make a comparative study of the advantages and yield of each ; from these crossings with the Madagascar as well as those of other crosses we are led to infer that in Hybridizing experiments :—

(1) The crosses of the type superior male with inferior female are invariably and consistently superior to the type superior female with inferior male.

(2) The maternal characteristics are generally predominant in the disposition of the crosses in being converted into uni-Di or Multivoltins, as in the following instances :—

Accidental Bivoltin female crossed with Nistari male-eggs laid all Univoltin or maternal.

Accidental Bivoltin male crossed with Nistari female-eggs laid all Multivoltin from the 3rd generation or maternal.

Madagascar female crossed with Nistari male-eggs laid change colour like the Madagascar to a slight pink on the third day and black on the 4th day or maternal.

Madagascar male crossed with Nistari female-eggs laid change colour like Nistari on the day before hatching or maternal.

(3) The colour of the cocoon and larval markings of our silkworm crosses follow strictly the mendelian principles of dominant and recessive characters. It has been noticed that the yellow character is the most dominant. As regards larval markings, the striped one is dominant.

Some Typical Crosses.

(1) Madagascar female crossed with Nistari male—Crossing of a pale white Madagascar race with yellow Nistari.

This race was first crossed on the 31st March 1914, and the female of the first generation was re-crossed on the 14th May 1915 with an accidental Bivoltin male. This cross—(Madagascar female crossed with Nistari male) female crossed with accidental Bivoltin male—is at present at the 7th generation and is continuing quite well, but the original (Madagascar female crossed with Nistari male) could not pass through the rainy season in Bengal. When we try to explain this fact from the remarks made above that a superior male crossed with an inferior female yields a better type, we find its application in this case. But this fault was rectified by re-crossing the female of the 1st generation with the male of an Accidental Bivoltin race thus bringing up the type to this standard.

The size of the worms is approximately 1½ times that of Nistari, whilst the larval markings correspond exactly with those of Nistaries.

The hatching of eggs is similar to that of the Madagascar race exhibiting maternal characteristics, in that the eggs change colour on the 3rd day to a slight pink and black on the 4th day. The colour and shape of cocoons are like the Nistaries, whilst the weight of silky substance in one cocoon is 3 grains against 1½ grains of Nistaries.

(2) Madagascar male crossed with Nistari female—

Crossings of a pale white Madagascar race with yellow Nistari. The dates of this correspond with the previous one. This crossing is at the 8th generation now. The cocoons are yellow in colour like the Nistaries and the worms are double those of Nistaries in size with larval markings like Nistaries. The eggs change colour on the day before hatching similarly to Nistaries.

But this race of worms being too big in size and susceptible of contracting grasserie as also in that the consumption of leaves is too great and the Bengal rearers would prefer a smaller race, we have established a smaller type by re-crossing as in the following :—

(Madagascar male crossed with Nistari female) Male (F) crossed the Nistari female.

(Type showing ¼th Madagascar blood and ¾th Nistari blood). Here, the colour of cocoons, larval markings and the hatching of eggs are exactly as in the preceding one, but the size of the worms have been brought down to 1¼ times the size of Nistari worms with a reduction of only ½ grain in the weight of silky substance in each cocoon from that of the bigger race ; thus, showing 2½ grains instead of 3 grains per cocoon. This slight decrease in silk is greatly compensated by the gain in space thus making it possible to derive more outturn by rearing in the same space.

(3) Crossing of a pale yellow race of Madagascar which is being continued since the time of Mr. Lafont. The cocoons are of golden yellow colour. The worms have markings similar to those of Nistaries and are 1½ times of their size,

B.—Crosses with Accidental Bivoltins.

Under natural conditions, the eggs of silk-worms undergo a partial development directly after they are laid, as shown by their changing colour. After oviposition, and until subjected to cold, the eggs of the Univoltin races are not capable of hatching out. This is the rule, although we find in a batch of annual eggs a few that hatch some fifteen days after they are laid. This is what is known as Accidental Bivoltins. By properly crossing the moths obtained by rearing these accidentally hatched lot of worms with Multivoltin races, the task of creating a Multivoltin breed is greatly facilitated as is shown from our experiments. Whilst if we cross a Univoltin male with a Multivoltin, we do not almost get any hatching at the second generation. But, by employing Accidental Bivoltins we get about 50 per cent. hatching and the 3rd is entirely Multivoltin. This has been clearly shown in the following experiments :—

About 50 worms were obtained by the accidental hatching out of an Univoltin breed and these were reared. But most of them died of flacherie and we got only four cocoons of pale white colour from which four male moths emerged out and were crossed on the 21st March as in—

Accidental Bivoltin male crossed with Nistari female.

The 1st generation gave only 25 per cent. hatching out whilst the second generation yielded 50 per cent. and the 3rd was entirely Multivoltin. This

race is at present at the 9th generation. This type promises very well, and we expect it to be a distinct type by itself in future.

We have preserved two kinds of worms from this. One type of worms resemble Chhotopoloo worms; whilst the others resemble Nistari types. But the Chhotopoloo type shows signs of breaking up, whilst the Nistari has practically become a fixed one.

The cocoons in both the cases are yellow in colour, there being simply some difference in shape.

The weight of silky matter in each cocoon is 2¾ grains for the Chhotopoloo type of worms, whilst 3 grains for the Nistari type.

Other Crosses.

We are also rearing several other crosses. One of these worth mentioning is a cross between the Mysore and the Madagascar cross. This is at the 3rd generation now and consequently it is too premature to say anything.

C.—Improvements of Indigenous Races by Selection and Rearing by Families.

Experiments on improving the following indigenous races are being carried on :—

Nistari	...	...	...	(Bombyx Craesi).
Chhotopoloo	...	...	...	(Bombyx Fortunatus).
Mysore	...	...	...	(Bombyx Meridionalis).

It is satisfactory to note that in all these cases the results obtained have been highly encouraging, so much so, that races originally containing simply 1½ grains of silky substance per cocoon have gone up to 2 grains per cocoon in eight generations only.

Each cocoon is weighed after taking out the chrysalis and only the moths out of the cocoons rich in silky substance and of good shape and hardness, are kept for reproduction. The female moths are then subjected to microscopic examination and the layings of the healthy moths alone are kept. The laying of each respective moth is then reared separately and any exhibiting slight tendency towards weakness, is rejected. Eventually in mating every care is taken to preserve the consanguinity of the families and the offspings are all homogenous.

Rearers' System.

In the houses of the rearers the silk-worms cannot be expected to be so carefully reared as in the Government nurseries. To test the strength and capacity of the races for resisting the rough and drastic treatment at the rearers' houses, we are subjecting a lot from each of our cross types to the same treatment for several generations. For instance, the system of delitage by means of thread-nets is done away with in this case; the worms are placed very thickly in the trays as also the layings are reared without examination. The races that were subjected to this treatment showed slight decrease in the yield of silk per kahon.

Yield of the Different Races.

The following table will show the yield of each type and the weight of each type of worms, etc.

Serial No.	Race.	Average weight in grain of one worm.	Average weight in grain of silky substance in one cocoon.	Number of kahons (1280 cocoons) required for one seer of raw silk.	Weight of floss for one seer of silk produce.	REMARKS.
	Pure Nistari.	Grs.	Grs.	K. P.	Tolas.	
1	Improved by selection ...	27	1½	11 4	23 0	This is an improvement upon the ordinary run of Nistaries which generally require from 14 to 18 kahons for yielding one seer of raw silk.
2	Madagascar male crossed with Nistari female, 8th generation.	47	2½	5 10	24 12	
3	(Madagascar male crossed with Nistari female) Male crossed with Nistari female, 18th generation.	28	1¾	9 0	25 0	

Serial No.	Race.	Average weight in grain of one worm.	Average weight in grain of silky substance in one cocoon.	Number of kahons (1280 cocoons) required for one seer of raw silk.	Weight of floss for one seer of silk produce.	REMARKS.
		Grs.	Grs.	K. P.	Tolas.	
4	Accidental Bivoltin male crossed with Nistari female, 8th generation.	45	2¾	5 14	25 5	
	Worms like Nistari.					
5	Accidental Bivoltin male crossed with Nistari female, 8th generation.	38	2½	6 8	27 13	
	Worms like Chholopoloo.					

These are only a few of the various types we have got. In each case the yield of silk has been considerably increased.

D.—Influence of Leaves on the Richness of Silk.

In Bengal the leaves are consistent and of good quality from October to April, and the deterioration in the quality continues from May to August. In order to preserve the vigour and hardiness as well as the quality of the silk of each of our races, a hill station has been started at Kurseong to try the effect of the climate of that place on these races during this time. This place is also intended to be utilised as a station for keeping the stock races during these bad months from May to August, provided the results are encouraging.

Kurseong Sericultural Station.

The working of this station has already commenced and we have just finished our crop there. The following comparative table showing the weight of silky matter in each of the lots sent there as against the weight of the same lots reared at Berhampore during the same period, will testify to the advantage and the good effect of this change.

Comparative statement of the average weight in grains of silky substance in one cocoon of the different crosses reared at the Kurseong Sericultural Station during May—June 1915, with the average weight in grains of silky substance in one cocoon of the same crosses reared at Berhampore during May—June 1915 :—

Serial No.	RACE.	KURSEONG SERICULTURAL STATION.			BERHAMPORE SERICULTURAL STATION.		
		Average weight of silky substance in one cocoon by taking ten readings.	Maximum weight.	Minimum weight.	Average weight of silky substance in one cocoon by taking ten readings.	Maximum weight.	Minimum weight.
	Big Worms.	Grs.	Grs.	Grs.	Grs.	Grs.	Grs.
1	Madagascar male crossed with Nistari female, 8th generation.	2½	3	2¼	2¼	2½	2
	Small Worms.						
2	Madagascar male crossed with Nistari female, 8th generation.	2¼	3	2¼	2¼	2½	2
	Worms like Chhotopoloo.						
3	Accidental Bivoltin male crossed with Nistari female.	3	5	2½	2¾	2¾	2
	Worms like Nistari.						
4	Accidental Bivoltin male crossed with Nistari female.	3	4	2½	2¾	2¾	2

In spite of rain and unfavourable weather prevailing throughout, the results have been specially interesting and encouraging. In the case of the accidental Bivoltin cross the maximum weight obtained from one cocoon came to 5 grains against maximum of 3 grains at Berhampore at this period. The temperature and weather charts shown below will show the respective weather conditions of the two places.

Kurseong Sericultural Station. *Berhampore Sericultural Station.*

Date.	TEMPERATURE.				Weather.	Date.	TEMPERATURE.					Weather.
	5 p.m.	10 a.m.	4 p.m.	10 p.m.			4 a.m.	9 a.m.	1 p.m.	5 p.m.	9 p.m.	
1915.						1915.						
9th May ...	Nil	78°	82°	74°	Cloudy and sultry.	6th May ...	Nil	84°	85°	85°	84°	
10th ,, ...	70°	73°	75°	74°	Cloudy and rainy.	7th ,, ...	83°	84°	84°	84°	84°	
11th ,, ...	71°	72°	74°	73°	Cloudy and sunshined.	8th ,, ...	84°	85°	85°	85°	84°	
						9th ,, ...	82°	83°	83°	84°	83°	Rained heavily.
12th ,, ...	72°	73°	74°	74°	Cloudy and rainy.	10th ,, ...	83°	84°	83°	82°	81°	
13th ,, ...	72°	73°	74°	74°	Ditto.	11th ,, ...	81°	82°	83°	83°	82°	
14th ,, ...	72°	73°	74°	73°	Ditto.	12th ,, ...	82°	83°	84°	82°	82°	
15th ,, ...	72°	72°	73°	73°	Ditto.	13th ,, ...	81°	82°	83°	83°	83°	
16th ,, ...	70°	71°	72°	73°	Ditto.	14th ,, ...	82°	84°	84°	85°	84°	Rainy cloudy.
17th ,, ...	70°	73°	75°	75°	Cloudy.	15th ,, ...	81°	82°	83°	82°	82°	
18th ,, ...	72°	72°	75°	74°	Cloudy and sunshined.	16th ,, ...	82°	83°	85°	85°	85°	
						17th ,, ...	84°	83°	84°	83°	83°	
19th ,, ...	4 A.M.	10 A.M.	4 P.M.	10 P.M.	Nil.	18th ,, ...	8.°	85°	82°	83°	84°	
19th ,, ...	71°	73°	77°	75°	Cloudy.	19th ,, ...	84°	82°	82°	82°	83°	
20th ,, ...	73°	74°	78°	72°	Cloudy and rainy.	20th ,, ...	82°	82°	83°	83°	83°	Rainy cloudy.
21st ,, ...	71°	72°	75°	70°	Ditto.	21st ,, ...	81°	82°	85°	85°	...	
22nd ,, ...	68°	68°	69°	69°	Rained heavily.	22nd ,, ...	82°	82°	85°	84°	85°	
23rd ,, ...	67°	67°	69°	68°	Ditto.	23rd ,, ...	82°	82°	83°	83°	82°	
24th ,, ...	67°	67°	69°	69°	Ditto.	24th ,, ...	81°	84°	83°	82°	82°	
25th ,, ...	68°	69°	71°	70°	Ditto.	25th ,, ...	82°	84°	87°	85°	84°	
26th ,, ...	68°	70°	73°	71°	Ditto.	26th ,, ...	84°	85°	...	87°	85°	
27th ,, ...	69°	69°	71°	70°	Cloudy and rainy.	27th ,, ...	85°	85°	...	86°	84°	
28th ,, ...	68°	68°	71°	70°	Ditto.	28th ,, ...	84°	84°	...	85°	83°	
29th ,, ...	68°	69°	72°	70°	Ditto.	29th ,, ...	84°	85°	...	85°	84°	
30th ,, ...	68°	69°	73°	71°	Ditto.	30th ,, ...	83°	84°	...	84°	84°	Rainy cloudy.
31st ,, ...	69°	69°	70°	69°	Rained heavily.	31st ,, ...	85°	84°	...	84°	83°	
1st June ...	67°	69°	70°	69°	Cloudy and rainy.	1st June ...	82°	83°	...	84°	83°	
2nd ,, ...	68°	68°	72°	69°	Rained heavily.	2nd ,, ...	83°	84°	...	85°	84°	
3rd ,, ...	68°	70°	72°	70°	Cloudy and sunshined.	3rd ,, ...	82°	84°	...	84°	84°	
						4th ,, ...	82°	83°	...	84°	83°	
4th ,, ...	68°	69°	68°	70°	Cloudy.	5th ,, ...	83°	83°	...	84°	82°	
5th ,, ...	66°	67°	69°	68°	Cloudy and rainy.	6th ,, ...	82°	83°	...	...	...	
6th ,, ...	67°	70°	72°	68°	Ditto.							
7th ,, ...	67°	70°	72°	70°	Sunshined and rained.							
8th ,, ...	69°	70°	72°	71°	Cloudy and drizzling.							
9th ,, ...	68°	69°	70°	70°	Cloudy and rainy.							
10th ,, ...	67°	68°	72°	69°	Cloudy and sunshined.							
11th ,, ...	69°	69°	70°	70°	Ditto.							
12th ,, ...	68°	69°	72°	69°	Ditto.							
13th ,, ...	67°	68°	72°	70°	Rained heavily.							
14th ,, ...	69°	69°	70°	70°	Cloudy and rainy.							
15th ,, ...	68°	68°	72°	70°	Ditto.							
16th ,, ...	66°	69°	70°	69°	Ditto.							

The proposed scheme.

Since the proposed scheme was clearly explained in his last report by Monsieur Grangeon, the originator of the same, I need not dwell on it here again. Its principal aim is to help the rearers in deriving good results and profits; it is proposed to substitute the indigenous races by these improved cross races during the months from October to April, whilst during the rainy and hot seasons from May to September they will be supplied with selected Nistaries, since these cross races cannot stand sufficiently well the effect of the climate of Bengal at that period. By sending the crosses to Kurseong during the bad season (May to August) their quality will be preserved, and the races may be again brought down to the plains in August and the seeds will be supplied to the rearers from October. The advantage of this substitution is obvious as is evident from the statement of the yield of each type shown above. The rearers in this way will derive more profit than by rearing Chhotopoloos or Nistaries, as the production will be doubled with very little additional expenses in rearing arising out of slight increase in consumption of leaves.

PRABHAT CHANDRA CHAUDHURI,

Superintendent of Sericulture, In charge Sericultural Research, Berhampore.

ANNUAL REPORT OF WORK DONE AT THE MIRGANJ NURSERY, DURING THE YEAR ENDING 30TH JUNE 1915.

I CONTINUED to be in charge of the nursery for the year under report.

1. The work consisted chiefly in the production of healthy indigenous seed and supply of same to rearers. The following is a statement of the outturn of the year and their proceeds :—

	Outturn.			Proceeds.		
	K.	P.	G.	Rs.	A.	P.
Seed cocoons	1,507	12	14	2,001	11	6
Cocoons	726	11	0	521	1	3
Rejected cocoons	114	6	0	30	8	9
Miscellaneous				13	8	0
Total	2,348	13	14	2,566	13	6

Against an outturn of 1,898 K and proceeds 1,797 of the previous year.

The quality of the seeds was more improved, and the result derived on the rearers was very satisfactory. The average price per kahon seed was Re. 1-5, and sixty-seven per cent. of the total outturn was disposed of as seed.

2. The nursery also did useful work in supplying seed to all the nurseries and the Rajshahi Sericultural School. This present arrangement of exchange of seed between the nurseries has been of great benefit.

3. A third work was keeping care of the work of the local rearers. They were helped with disinfectants and instructed in the use of them. I am glad to report there has been no epidemic disease among their worms throughout the year.

4. Experiments with other races of worms producing white cocoons were tried from seeds sent by the Imperial Entomologist. They could be reared like the indigenous races and their cocoons were better. These experiments will be repeated to arrive at a definite result.

5. I visited the Bogra Nursery twice. Bogra claiming to be the favourable place for Chhotopoloo worms, efforts are being made there for the production of disease-free Chhotopoloo seed for supply to the larger nurseries. These have in their turn got to supply the seed reared from Bogra seed to rearers. The seeds produced there last year were more improved than those of the previous year.

6. I visited the Rajshahi Sericultural School twice. The school admits twelve apprentices, who are to be rearers' sons, every year. Twelve apprentices passed out of the school last year, and they were instructed in the Pasteur System of work.

7. The nursery at Mirganj has been developed by one more rearing house and ten bighas mulberry.

8. The staff remains as usual.

M. M. CHAKRAVARTI,
Supdt. of Sericulture, Mirganj.

MIRGANJ,
The 28th June 1915.

WORK DONE AT THE BERHAMPORE CENTRAL NURSERY, DURING THE YEAR ENDING 30TH JUNE 1915.

Outturn.

Seed-Cocoons.			Cocoons.			Rejected Cocoons.			Leaves Sold.		
K.	P.	G.	K.	P.	G.	K.	P.	G.	Md.	Sr.	Ch.
2,145	0	15½	895	9	10	29	2	5	335	0	0

Remarks.

Seed-cocoons were sold to purchasers from Rajshahi, Malda, Birbhum and the Murshidabad districts. The results have been highly satisfactory in Murshidabad district. In other places in spite of the difficulties and dangers

in the journey by train, etc., especially in this season, the outturns have been quite satisfactory. As seed-cocoons have to be taken in caskets by purchasers going by train, these naturally get heated. In addition to this, the negligence of the railway staff at the time of transhipment is also a great drawback. I have been sending one Overseer with each batch up to Lalgola to see to the proper transhipment, but even then great difficulty is felt there for coolies and the bad effects of the journey cannot be avoided.

It is, however, worth mentioning that in several places the outturns from this nursery seed were sold as seed-cocoons, and the rearers derived more income accordingly. This selling of their produce as seed-cocoons clearly indicates that the seed-cocoons supplied from the nursery were free from disease, as no rearer would purchase any other than good ones for seed purposes without critically examining the condition of the worms at the spinning time.

Village Work.

Arrangements have been made to disinfect the houses of silk-rearers in certain localities. Several rearers have been selected who will rear for selling their outturns as seed-cocoons. Their houses will be disinfected at Government expense, and they will be offered every help in the way of instruction.

Besides, the scheme to help the *ex*-students of Berhampore Sericultural School to rear for selling their outturn as seed-cocoons is under contemplation, and arrangements are being made to offer them every facility.

Sericultural School.

The working of the school continued regularly. The students were taught the theories and practice of rearing of silk-worms, microscopic examination, detection of diseases and the cultivation of mulberry lands with some rudimentary knowledge of general agriculture. Two of the senior students are to be examined by the end of July.

Some of the *ex*-students were supplied with thread-nets, microscopes and wire-nets, as their rearing houses have been completed.

Extension of Mulberry Land.

About seven bighas of waste lands have been brought under cultivation this year, thus bringing the total area of cultivated land to nearly 71 bighas. The old system of planting the mulberry bushes near each other with only a margin of one foot between the rows, is to be substituted by planting the rows at a distance about 5 ft. apart in order to employ the improved system of hoeing for interculture and thereby reduce the cost of cultivation to some extent.

PRABHAT CHANDRA CHAUDHURI,
Supdt. of Sericulture, Berhampore.

BERHAMPORE,
The 3rd July 1915.

REPORT ON SCIENTIFIC WORK IN CONNECTION WITH SILK DONE FROM 1ST APRIL 1915 TO 30TH JUNE 1915 BY MISS M. L. CLEGHORN, F.L.S., F.E.S.

THE Government of Bengal sanctioned a grant of Rs. 5,000 per annum for me to continue and extend my research work in connection with silk. Owing to the present financial stringency the Government of Bengal was unable to sanction a larger sum, so Mr. J. A. Anderson, of Messrs. Clark, Wilson & Co, London, and of Messrs. Anderson, Wright, & Co., Calcutta, arranged to continue his grant of Rs. 150 per mensem for the next two years. My father, Mr. James Cleghorn, is also making me an allowance of Rs. 150 per mensem, as this research work entails considerable expense.

The experiments in cross-breeding started at 57, Ballygunge, were removed on the 1st May 1915 to 5, Alipore Road, where the ground floor is eminently suitable for the silk laboratory and rearing rooms, and the extensive grounds for a mulberry plantation, and the large stabling is being converted into a control rearing house.

A multivoltin hybrid race of silk worms, started in January 1911 and reared on only a small scale, is now being continued on a much larger scale, and the 36th generation of this cross has given cocoons superior to the Nistari. As I am now able to work on a large scale, I hope to fix this race as it has given promising results, considering the very small scale on which it has been kept up for 36 generations. Mendelian and other experiments on the inheritance of the brood characters, weight of cocoons, etc., will be started on an extensive scale as soon as there is sufficient mulberry.

Regarding the mulberry, owing to the great heat in April, it was doubtful whether the mulberry plantation could be laid out before October, but early in May there was heavy rain and, as the land was already prepared and manured, the opportunity was taken advantage of and about 350 bushes of mulberry were transplanted daily from the plantation at Ballygunge, to the extent of about 2,000 bushes in all. This was an experiment which might have failed entirely during the month of May, but it was risked with very happy results, for there was a loss of only 1 per cent., and now, about eight weeks after, the bushes are 5 to 6 feet high and covered with an abundance of healthy leaf. About half a bigha has been planted out with cuttings of Berhampore mulberry, which promises well. Other specially selected fruitless mulberry, of which I have 70 plants, and which will bear leaf between October and January, when leaf is very hard to obtain, have also been successfully transplanted. Two hundred and thirty saplings of male mulberry have also been successfully transplanted, at the rate of ten per day, and laid out 10 feet apart. Three hundred seedlings of a good variety of mulberry have been potted out, and several thousands of cuttings of various good varieties have also been planted. Nearly the whole of the grounds have now been utilised, but from want of land over 400 trees, among which are many Hungarian mulberry, have had to be left behind at Ballygunge till the Government allot a few more bighas of land.

My experiments in germination have shown that the Indian varieties of mulberry must be sown in Bengal in March and April from freshly gathered fruit, and not in June and July or in October.

Experiments are also in progress regarding the most suitable manure and texture of soil, etc., for mulberry cutlivation.

Regarding the irrigation of mulberry, I have found that it derives no good from it, the plants producing pale-coloured sickly leaves.

M. L. CLEGHORN.

ANNUAL REPORT ON THE WORKING OF THE SERICULTURAL SCHOOL, RAJSHAHI, FOR THE YEAR ENDING 30TH JUNE 1915.

THE school was made over to Government in January 1907. Since then it is being managed by a Managing Committee under the Director of Agriculture, Bengal. The school teaches practical methods of—

(*a*) mulberry cultivation;

(*b*) microscopic seed selection;

(*c*) detention and prevention of silk-worm diseases:

(*d*) rearing of silk-worms.

The school is in possession of 22 bighas of land at Kadirganj, within a mile of the school. Of this 15 bighas are under mulberry cultivation against 8 bighas of the previous year.

The cocoons grown in the school are gaining popularity among the Bashnis. They take cocoons from the school for their seeds.

Four crops of cocoons were raised in the school in the year under report, viz., in July and September 1914; in January and April 1915 amounting to 353 kahans 8 pons of cocoons, of which 9 kahans 8 pons were kept for microscopic examination in class and the rest was sold as seeds to the Bashnis of different Joars of this as well as Malda district. The total receipt was Rs. 389-10 against Rs. 427 of the previous year. The decrease is due to the mulberry cuttings for planting new lands.

Teaching Staff.—There is a Head Master who teaches sericulture and, with the help of a rearer, practical rearing is taught. The Head Master had

from time to time visited the model rearing houses of passed students and gave instruction to the village Bashfiis regarding silk-worm rearing.

Model Nurseries.—Have been started by the *ex*-students of the school and arrangements have been made to inspect the nurseries and to see how they make profit by rearing silk worms.

Quarterly reports of the model nurseries are called for and received. They show that the nurseries are doing well.

Students.—There were 11 boys in the beginning of the year. Ten appeared at the final and all passed. They would receive their rewards in the next winter. Four boys of the previous year received second instalment of their rewards and a microscope. There were 12 boys on the roll on the 30th June, 7 of whom are Muhammadans and 5 Hindus. Six of these belong to this district. The students cultivate a plot of ground, each measuring 1 cottah.

Microscopes.—There were 21 microscopes, of which four were given in the year; 17 are in stock.

The half-yearly examination is just over, the result of which has not yet been declared by the Committee.

Discipline.—No case of breach of discipline has come to the notice of the school authorities in the year under report—

Receipts.

	Rs.	A.
Sale-proceeds of cocoons	389	10
Government ...	5,842	6
Total ...	6,232	0

Expenditure.

	Rs.
Establishment ...	856
Stipend	1,017
Appliances	100
Books and maps ...	20
Repairing, etc. ...	766
Rewards	1,000
Taxes	123
Contingencies	2,350
Total ...	6,232

The school was visited by the Director of Public Instruction on 8th December 1914, Mr. M. M. Chakravarti on 27th December 1914, Director of Agriculture, Bengal on 30th December 1914 and 8th May 1915, Mr. M. M. Chakravarti on 26th June 1915.

There were three meetings of the Managing Committee during the year under report.

K. BANERJI,

Secretary, Sericultural School, Rajshahi.

No. 41, dated Malda, the 11th July 1914.

FROM—N. NARAYANS PILLAI, Weaving Master of Bengal.

TO—The Director of Agriculture, Bengal, Writers' Buildings, Calcutta.

WITH reference to your memorandum No. 3758-60, dated the 4th May 1915, I have the honour to submit the following annual report regarding the work done by me from 1st July 1914 to 30th June 1915.

During the year ending with 30th June 1915 I availed myself of leave for 22 days and I had been out on tour for 296 days to attend to works as detailed below:—

I visited Alipore, Dakshinpara, Uttarpara, Magikanta, Nurpur, Nazirpur, Pukuria, Bamankanta, Sonakola, Amrithi and Janti near Banga in the district of Faridpur in connection with the organization of weavers' co-operative societies and organized the following six societies at fixed centres—Paschimsadardhi, Nurpur, Magikanta, Amirthi, Janti and Alipore with the approval and sanction of the Registrar of Co-operative Credit Societies. It was arranged that the working capital for the above said registered societies should be supplied from the Central Bank of Faridpur. Members were admitted into the above societies, and the office-bearers were also appointed in the first general meeting that was convened. Arrangements were made for the supply of raw-material (yarn, etc.) soon as the funds were advanced to those societies. Besides these, demonstrations of the application of improved accessories in country flyshuttle looms were conducted in order to

induce the weavers the advantages they would derive if they joined as members of the weavers' society. The objects of the above society are for the present to supply at a less cost genuine raw materials quite similar to their samples and to advantageously dispose of the fabrics manufactured by the members. I also organized a weavers' society at Gossainhat keeping its head-quarters at Tangra-Bazar and combining with it members from Haturia and Tangra-Bazar. Papers and requisitions were forwarded to the Registrar for registration of the society. At Gopalganj in Faridpur the Subdivisional Inspector inspected the working of weavers who had attended my weaving demonstrations, and I consulted with them if they could form a weavers' society. They acceded to my proposals, convened a meeting and forwarded an application to the Registrar for registration.

I visited Pingna in the district of Mymensingh and conducted weaving demonstrations on improved flyshuttle looms and warping apparatus to the benefit of weavers in and around that place. I visited also Tangail, as desired by the Registrar of Co-operative Societies and the Secretary to the Tangail Rural Bank to organize a weavers' society at Bajitpur. A meeting was held to that effect; but, the only objection the weavers raised was that they were not able to pay more than 7½ per cent. interest on loans advanced by the Rural Bank. The matters were reported to the Registrar, who anyhow registered the society to give it a start. As desired by the Registrar, I visited Nalsonda, Sharuncha, and Bella in order to organize similar societies amongst the weavers.

I visited English Bazar, Shujapur, Sibgunge and Kaliachuck in the district of Malda in connection with demonstration and introduction of the improved reeling machine amongst the silk reelers. At Shujapur—the prominent silk-reeling centre—the reelers very much appreciated the working of my improved machine, as they found it to be really useful and profitable, and in order to give wide publicity to those machines six similar ones were made for distribution among selected professional reelers and arrangements were also made to realize their cost by monthly instalments. All the six machines were readily taken up by them as proposed. It was also suggested to follow similar course while distributing the machines to English Bazar and Kaliachuck reelers. At English Bazar a meeting was held at the house of the Vice-Chairman of Malda District Board to organize a reelers' co-operative society so as to enable the members of the society to purchase such improved reeling machines and also to get advances from the society in order to gather cocoons advantageously from hâts. On forwarding the proposals to the Registrar, the interest of 6 per cent. demanded by the members on the working capital being abnormally low, he was unwilling to register such a society. Further, the funds of the Rural Bank of Malda having been very short then, the proposals were put off for some other time. I visited Sibganj in Malda district and inspected the working of silk weavers; and on their request, a new type of automatic dobby is being prepared. This apparatus is to automatically work out floral designs on the borders of silk fibres manufactured there and thereby to greatly facilitate their labour and cost of manufacture.

I visited Cox's Bazar in the district of Chittagong in order to inspect the local weaving school that was started there for the use of Mogh weavers and also to organize, as desired by the Subdivisional Officer and other influential gentlemen of the locality, a weavers' society on limited liability and on joint-stock system. The society was therefore organized on a working capital of Rs. 5,000, of which Rs. 1,500 to be had from the District Board and the remaining sum to be collected on account of sale of shares valuing Rs. 100 per each share. It was also proposed that a regular supply of reeled silk from Murshidabad or Malda should be arranged for. The Moghs weave only coloured silk lungees and export them to Rangoon.

I visited Berhampur, Jankipur and Khagra in the district of Murshidabad. At Berhampur the working of the improved reeling machine was demonstrated to Pattergata reelers. Six improved reeling machines were made locally for the purpose of distributing them to Malda reelers. I inspected the working of Jankipore reelers and wool weavers giving the former suggestions how the improvements on the improved reeling machine could be applied on the existing reeling machines; and to the latter, how to wash wool with germicidal solutions and vapours such as copper sulphate, sulphur fumes, carbon bisulphide and mercuric chloride and also by absolute removal of yolk from the shorn wool or by immersing the prepared fabric in soft soap solution. The preparation of raw wool by the wool

weavers at Jankipore is so very crude and antiquated that fabrics manufactured out of such wool are very soon affected by germs and insects, and the above process was suggested to rectify the longstanding defect.

I visited Gangarampur, Kuchiamora, Tatiband, Tarabaria and Kawpara in the district of Pabna in connection with the organization of weavers' co-operative societies as suggested by the Registrar. The societies were organized at Gangarampur, Kuchiamora, and Tarabaria and the papers forwarded to the Registrar for their registration. It was also proposed that they should be financed by the Central Bank of Pabna at 9¾ per cent. rate of interest on loans. I visited the working of weavers at Dogachi (Pabna district) and arranged to supply them improved steel reeds that would be suitable for this work. I visited Bharenga, as desired by the Registrar of Co-operative Societies, and reconstituted the old Bharenga Weavers' Society, changing its head-quarters to Nuthen Bharenga and admitting more members from the surrounding villages of Edarakpore, Bagchor and Pengna. The matter was reported to the Registrar and he accorded his approval and sanction for doing so

I visited Ramjibanpur, Ghatal, and Daspur in the district of Midnapur and inspected the working of weavers of the respective areas. As the weavers there stood in great need of fast coloured yarns and other weaving materials alone at a cheaper rate to keep them working on, I made arrangements with a Calcutta firm to supply them.

I visited Comilla, Manamati, Ghoshnagar and Jafrabad in the district of Tippera as desired by the Collector of Tippera and the manager of Bhukailash Raj Estate. The Collector wanted me to enquire into the reason why Manamati *charkanas* (cotton checks) did not now-a-days find a ready market. On a close enquiry, I came to know that first, fast coloured yarns were not readily available in the market as the weavers used to get two years ago. Secondly, even while genuine articles were made and brought to market for sale, the local *mahajans* intentionally depreciated their value to purchase them at a cheaper rate. And when fabrics were manufactured with fugitive coloured yarns they were looked down by the purchasers also. Thirdly, the weavers being too poor to adopt improved automatic flyshuttle looms, etc., they could not cope with commercial mill competition. Fourthly, they invariably were indebted to *mahajans* who consequently control their works and the market outside. In order to improve their condition it was suggested to organize a weavers' society, and a public meeting was convened at Manamati to its effect. It was proposed in the meeting to keep Ghoshnagar as the centre and to admit members from Manamati and the surrounding nearest villages. The proposals and requisitions were forwarded to the Registrar for his approval and sanction. I visited Jafrabad and found that weavers had adhered to my improvements that were applied in their flyshuttle looms.

I visited Chandshi, Dhuriail, Barisal and Bandoba in the district of Bakarganj and inspected the working of weavers of the abovementioned areas, where I conducted weaving demonstrations on a former occasion. The weavers there being cultivators as well and on account of loss they sustained owing to the fall of jute market, they expressed their inability to spend any fresh sum on improved looms or their accessories which they had required from me sometime previous.

I visited Serampore in the district of Hooghly in connection with the organization and working of Serampore Weavers' Co-operative Society.

I visited Nawabpore and Tatibazar in the district town of Dacca and demonstrated improved warping apparatus and the automatic flyshuttle loom for the use of Nawabpore weavers. Repaired and brought to working state one automatic flyshuttle loom that belonged to Ramchandra Basak of Tatibazar. To improve the condition of Dacca weavers, it was proposed and consulted with the local weavers, through the influence of Babu Rajendra Nath Basak and Rai Saheb P. N. Chaudhuri, honorary organizer of co-operative societies, to organize a weavers' co-operative society on unlimited liability and to raise the working capital by means of selling shares. It was also proposed and concluded that if Government help was mot extended as shown to other weavers' societies, the proposed society should be started up at least on a joint-stock system. The above proposals were forwarded to the Registrar for his suggestions and approval.

N. N. PILLAI,
Weaving Master.

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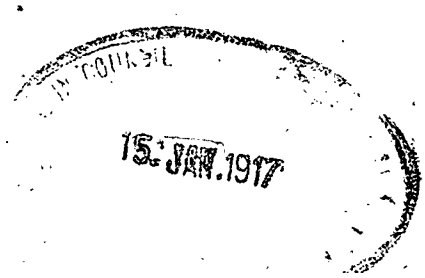
ANNUAL REPORTS

OF THE

EXPERT OFFICERS OF THE DEPARTMENT OF AGRICULTURE, BENGAL,

FOR THE YEAR ENDING

30TH JUNE 1916.



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ANNUAL REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, WESTERN BENGAL, FOR THE YEAR ENDING 30th JUNE 1916.

Charge.

1. I was in charge of the Western Bengal Circle throughout the year except from 14th August to 11th October 1915, when I took privilege leave. Mr. Kenneth McLean officiated for me during that time.

During the period under review I supervised the work at the Chinsurah, Burdwan and Kalimpong farms, controlled the demonstration work in the Burdwan and Presidency Divisions, organised departmental exhibits at agricultural exhibitions in these divisions, supervised the two divisional seed stores, attended meetings of agricultural associations, helped to check jute areas in Western Bengal, and made arrangements for supplying rabi seeds throughout the famine-stricken areas of Bankura.

Officers.

2. Babu Chuni Lal Mustafi was the Superintendent in charge of the Chinsurah Farm throughout the year. He has three overseers to assist him. They worked well. Babu Jogendra Charan De was the Superintendent in charge of the Burdwan Farm throughout the year. He worked well. Mr. Edmunds was in charge of the Kalimpong Farm, and did very useful work.

Mr. J. N. Sirkar was the Superintendent in charge of district work in the Burdwan Division. He did a very strenuous and useful year's work. He had only two district agricultural officers and five demonstrators to help him. This staff is quite inadequate to do even a part of the work that requires to be done. Eleven jute clerks were employed for four months on forecast work in this division.

Mr. H. P. Mittra was the Superintendent of Agriculture in the Presidency Division. He worked well and conscientiously and was ably supported by Babu Sachindra Krishna Dutt, the only District Agricultural Officer in this division, and 7 demonstrators. The staff of this division is also too small. Thirteen jute clerks were employed for four months on forecast work in this division.

Tours.

3. I was on tour 124 days in the year, and during this time I inspected the Chinsurah Farm 25 times, Burdwan Farm 17 times and Kalimpong Farm 3 times.

I devoted a considerable period in the districts to demonstration work and visited all places named below, where definite tests were made. I visited the Birbhum district 5 times, Bankura 5, Jessore 4, Burdwan, Hooghly, Midnapore, 24-Parganas, Nadia and Murshidabad several times. Details of villages inspected are given below.

District work is most active in the Birbhum district, where for 1916 alone 60 maunds of groundnuts, 500 maunds of bonemeal and 40 maunds of dhaincha seed have been distributed.

We are chiefly concerned in demonstrating in the Burdwan Division the economic value of groundnuts, bonemeal and dhaincha green manure on aman paddy, castorcake and nitrate of soda on jute; also better yielding varieties of cane, viz., Mauritius and Barbadoes, in places where cultivators are willing to manure heavily and irrigate. In Birbhum, we did detailed work in the Sadar and Rampurhat subdivisions, where we obtained definite results at Shahpur, Hetampur, Purandarpur, Indragacha and Bolpur in the former and at Sekedda, Sandhyahat, Joykristopur and Nalhati in the latter subdivision. Definite work with satisfactory results were obtained in the Burdwan district at Chakdighi, Ajhapur, Debipur and Satgachia in the Sadar subdivision, Dhatrigram and Bahra in the Kalna subdivision and at Patuli in the Katwa subdivision.

In Bankura, work was carried out at Taldanga, Gangajalghati, Kalikapur, Palashdanga, Chatna and Ondagram in the Sadar subdivision and at Vishnupur in the Vishnupur subdivision, but results were adversely affected through the great scarcity of rain.

In Howrah, we are doing a little work at Burikhali (Uluberia subdivision) and at Danka (Sadar).

In Hooghly, Babu Saroda Charan Mitter is doing a lot of useful work at Paniseola (Serampore subdivision), while in Midnapore the Raja of Narajole at Gope (Sadar) and particularly at Narajole (Ghatal subdivision) is doing very satisfactory work with irrigation implements. At Contai (Contai subdivision) also some work is being done.

In the Presidency Division, the chief work consists in demonstrating the economic value of castorcake and nitrate of soda on aus pady; dhaincha green manure on aman paddy; castorcake and nitrate of soda on jute, Mauritius and Barbadoes canes and Ceylon papya. Groundnuts also grow well in this division, but this crop grows only on land that grows high-land jute, and jute is the more profitable crop. Definite work was carried out in the following places :—

	Village.	Subdivision.	District.
1.	Nangi ...	... Sadar ...	... 24-Parganas.
2.	Malancha	... Do. ...	... Ditto.
3.	Rajibpur	... Baraset ...	... Ditto.
4.	Jamalpur	... Ditto ...	... Ditto.
5.	Ghoshpur	... Basirhat ...	... Ditto.
6.	Murel ...	... Sadar ...	... Jessore.
7.	Kotchandpur	... Jhenidah ...	... Ditto.
8.	Mamunsoa	... Ditto ...	... Ditto.
9.	Hardi ...	... Chuadanga ...	... Nadia.
10.	Berhampore	... Sadar ...	... Murshidabad.
11.	Banjetia	... Do. ...	... Ditto.
12.	Ghuni ...	.. Do. ...	... Ditto.
13.	Beldanga	... Do. ...	... Ditto.
14.	Ramnagar	... Do. ...	... Ditto.
15.	Jorur ...	... Jangipur ...	... Ditto.

The good results from cheap manurial applications on aman paddy, aus paddy and jute are very gratifying as this expenditure, viz., 4 annas per bigha for dhaincha green manure, Rs. 2-8 for aus paddy and Rs. 5 for jute, is well within the means of the poorest cultivator. Babu Saroda Charan Mitter and Rai Bahadur Lalit Mohan Singh Ray of Chakdighi, two old and experienced inhabitants and workers in the Burdwan Division, say that castorcake is well known and much used as a manure for jute, paddy and potatoes in their districts. Castorcake is a very popular manure with potato growers in the Burdwan Division. This manure can be demonstrated with advantage on other crops in other districts with a view to make known its economic value.

Agricultural Stations.

(1) *Chinsurah.*—The season was a favourable one for jute, but not for paddy. The good rainfall from March to May and the moderate fall in June proved ideal for jute cultivation.

For paddy, however, the case was different, the rains being only sufficient to allow of ploughing. Puddling was not possible before July and August, and when the rainfall ceased in September, the condition of the crop became precarious, particularly of those plots that could only be puddled in August.

It will be obvious from the above that difference in yields must result from these variations of rainfall from year to year. With the jute crop the variation goes from no crop at all in one year to 30 maunds per acre in another. This year the paddy crop has yielded about 20 maunds per acre, whereas in other years the outturns have been from 35 to 40 maunds.

It is on account of this that it is so difficult to make definite recommendations to cultivators in general. Where water can be given at fixed times or there is sufficient rainfall it is a simple matter. For instance, we recommend

dhaincha green manure for paddy, but in some places this year there was not enough water to puddle the crop. The weather was perfect for growing the green manure crop, but when puddling time came there was not enough water to prepare the land for transplanting. In any case, however, there would have been no paddy crop, so the manure remains for the benefit of this year's crop.

Again it is easy to understand that a variety of a crop from a locality where rainfall is abundant can never hope to compete in another locality where rainfall is deficient and where a type has developed suitable to these adverse circumstances. If a superior type is to be evolved, it will only be by selection from the best in each locality where the particular adverse conditions exist.

The construction of water storage tanks might be recommended, but whether such would prove an economic success with present prices of labour and produce is doubtful. However, this point is receiving attention. With small holdings, which are the rule in Bengal, water storage areas are not so important as for large holdings, for with a small area one can take advantage of every opportunity for preparing the land, sowing and reaping the crop, which is not always possible where large areas are concerned.

As regards jute, it has been our experience that the *olitorius* type is better than *capsularis* for this district, and we are endeavouring with Mr. Finlow's guidance to evolve a superior variety of this type. Much work has been done in this direction.

So far as manures are concerned (this work was carried out in collaboration with Mr. Annett, Agricultural Chemist) excellent economic results were obtained on jute from the following applications (1) 10 maunds of castorcake; (2), superphosphate, 100 lbs. *plus* sulphate of ammonia 50 lbs.; and (3) nitrate of soda 1 maund (82 lbs.) per acre.

With paddy, selection work was done under the guidance of the Economic Botanist, and although his improved type Dacca No. 1, previously called Indursail, did not equal the local Nagra variety in yield, I look forward at no distant date to obtaining a better type of seed than is generally grown by the ordinary cultivator.

With regard to seed rates for seedbeds, we find that a rate of 20 seers per bigha gives better results than 30, 40 or 80 seers.

Two seedlings per hole planted on the 15th of August again gives better results than 4 seedlings planted on the same date or than 4 or 8 seedlings planted on the 30th of August. Dhaincha green manure gave an outturn of nearly 11 maunds per acre over the unmanured plot, while cowdung (100 maunds) *plus* sulphate of ammonia (1 maund) gave an outturn of 9¼ maunds per acre above the unmanured plot and 3¼ maunds above the "100 maunds of cowdung plot." Nitrate of soda 1 maund (82 lbs.) per acre gave an increased outturn of nearly 7 maunds over the unmanured plot. This is extraordinary and quite different to results obtained in Japan and Madras, where they claim that nitrate of soda is not very valuable as a manure for paddy. It should be remembered, however, that in Western Bengal conditions are totally different to those in Madras, where the paddy crop grows in water from transplanting time till harvest time. In Bengal there are millions of acres of paddy where the crop is a dry land one from October to December: such is the case at Chinsurah.

In collaboration with the Agricultural Chemist tests were made with varieties of sugarcane and a good supply of setts of superior varieties were distributed to cultivators.

(2) *Burdwan.*—At this farm paddy, jute, cane, groundnuts and potatoes were grown satisfactorily. The Superintendent is now beginning to know local conditions, and better results are being obtained. The growing season of paddy is very short on this farm and so far the local Jatakalma variety has proved the best yielder. The Economic Botanist is now testing other varieties with a view to evolve a superior type. Both 1 maund of sulphate of ammonia and 1 maund of nitrate of soda in addition to 60 maunds of cowdung gave an increased outturn of 10 maunds per acre over the unmanured plot, while bonemeal 3 maunds *plus* nitrate of soda 1 maund; bonemeal 3 maunds *plus* nitrate of potash 1 maund; and bonemeal 3 maunds *plus* sulphate of ammonia 1 maund, gave an increase of 10 to 11 maunds per acre over the unmanured plot.

Dhaincha green manure gave an increase over the unmanured plot of 10 maunds per acre.

Good crops of jute were grown, but there was no distinct superiority of any of the varieties grown. With potatoes, the Darjeeling variety was easily

the best yielder, giving an outturn of 245¼ maunds per acre in comparison with 99½ maunds from the Nainital variety. With regard to the manuring of this crop, a mixture of 10 maunds castorcake, 300 lbs. nitrate of soda and 200 lbs. superphosphate gave an increased outturn over 20 maunds of castorcake of 65¼ maunds of potatoes per acre, while the unmanured plot only yielded 93¼ maunds per acre. Potatoes were grown after jute which had been manured with 100 maunds cowdung per acre.

With sugarcane, the white Mauritius cane was far superior to the local variety (Khari) in both newly planted and ratooned plots. In the newly planted plots the outturns were 96½ maunds and 42 maunds of gur per acre, while in the ratooned plot the outturns were 84 maunds and 24 maunds of gur per acre respectively.

Twenty-three thousand cuttings of white Mauritius cane were distributed to cultivators this year.

Groundnuts. A crop of 10 maunds of nuts per acre was grown on barren land that had previously grown no crop at all.

Kalimpong.—Another good year's work in this farm has to be recorded. During the period under review the work of previous years was continued and enlarged and what is being done was brought more to the notice of neighbouring cultivators as well as to interested people who are in a position to spread the information further afield amongst the raiyats of these hills. Everyone is cordially invited at any time to pay a personal visit and see for himself the work in progress and ask questions about the recorded results in the report below. Parties of khas mahal raiyats, teachers under Dr. Sutherland and school children are being given practical demonstrations on the farm in seed selection, threshing and winnowing as well as grafting, budding and root and branch pruning of fruit trees. Vegetable cultivation is also being demonstrated.

A comparative statement of figures of receipts and expenditure per acre in the neighbourhood of Kalimpong of a cultivator of maize, rice and cardamums for the years 1903 and 1916 is very instructive as well as interesting, for it shows the value of a farm such as this. This enquiry was due to J. T. Rankin, Esq., Deputy Commissioner, Darjeeling, and as Dr. Graham allows me to use the figures he supplied, I have extracted very freely so that general readers may have a good idea of the agriculture of this district and may be able to judge of the improvement in the condition of the people that has taken place in these hills during the last 12 years.

It is remarkable how difficult it is to obtain accurate figures without going into the matter systematically for a whole season. This report, which is given in this year's annual report, tries, however, to throw some light on the subject. Conditions vary so much that a single table cannot be compiled to suit even the region round about Kalimpong. The range of altitude from 1,000 to 4,500 makes that impossible.

The conclusions from these figures are—*First*, with *maize* the position of the cultivator has greatly improved in the 12 years. While land which has been cultivated continually without manuring will give less, the general output is greater, due to greater care with seed and more attention on the whole to manure. Still greater care and attention can produce still better results in the future. The cost of cultivation has increased (20 per cent. would probably cover the increase), but the value of the grain has increased at least 75 per cent. The position of the second crop (*e.g.*, Kodo) has also improved.

With *rice* the position has also improved. The output may be a little less and the cost of cultivation higher, but the increase in price more than makes up for these. The farm yields are very poor, but with experience and continuous control the outturn will be increased to 30 maunds per acre.

With *cardamums* I believe the position is less favourable. The price is less and the expenses are higher. This crop is of such a speculative nature that Dr. Graham strongly urges a sliding scale for the rental, such as that proposed by Mr. Bell in paragraph 36 of his letter of 3rd May 1902 (Settlement Report). Dr. Graham is convinced that the agricultural outlook is much better than in 1902. The people as a whole seem to him to be much better off. My experience since 1904 corroborates these views. The increased expenditure on drink alone (the *revenue* from which is greater than from the land) indicates this in an unfortunate way. The articles sold in the bazar are another indication.

The scale of compensation demanded on the transfer of land has increased enormously. In the immediate neighbourhood of Kalimpong it has increased by *more than 10 per cent.* in the 12 years and in the outlying districts by several hundred per cent.

The price of maize nowadays rises from Rs. 3-1 per maund at harvest time in August to Rs. 4-8 to Rs. 5 in April. By means of a storage shed, maize can be very well stored, as we have found by experience these last few years. Here is a chance for Co-operative Credit Societies to do something. By co-operative sale, cultivators could obtain an extra rupee per maund for their maize.

The chief work done on this farm has been on maize. In 1915-16, 37 maunds of selected seed were distributed (sold) to cultivators as compared with 9 maunds in 1914-15 and 3 maunds in 1913-14.

The effect of terracing on this farm may be thought to give conflicting results, as again maize on the unterraced plot gave a larger outturn than from the terraced plot, while the second crop of soybeans or buckwheat is always best on the terraced plot, but the question is a very complicated one. Maize will grow on terraced land, while *aman* paddy is not economical on unterraced land. Terracing allows of accumulation of water and conserves water for a longer period than on the unterraced land where water drains off very rapidly. Terracing prepares land for aman paddy and prevents the rapid washing away of the hillside. The results, however, so far do not justify economically the extra expenditure incurred in laying out the terraces in question.

A careful study of the report below shows that the rotation for this hillside is maize and kodo on the same land in the same year. From the area under maize and paddy (nearly 50,000 acres of each) in this district it will be seen that both crops are popular. An increase of 10 maunds of maize per acre alone means Rs. 15 lakhs in the district. By manuring alone this can be accomplished. This, in my opinion, justifies the employment of a whole-time District Agricultural Officer in this district for demonstration work alone.

There are other agricultural products that deserve attention by the cultivators of this hillside. I shall mention here only pineapples, fruits, such as oranges, peaches, plums, naspatis, and plantains and vegetables. All these thrive exceedingly well.

Now that the railway comes to Teesta Bridge, the Calcutta market is brought within reach of the Kalimpong raiyat.

Pineapples can be grown as a field crop. The following are the figures for ½ an acre grown on this farm. The land was ploughed, cleaned and suckers were planted in rows 3 feet apart in September 1912 :—

Expenditure.				Receipts.				
		Rs.	A.					Rs. A.
Up to 1913	...	102	10	54	pines at	2½	annas	8 7
1914-15	...	27	14	497	„	2	„	62 2
1915-16	...	31	0	1,002	„	2	„	125 4
Total	...	161	8	Total			...	195 13

This crop is now firmly rooted and with little or no expenditure will yield large crops of pines for several years. A record is being kept.

Fruit cultivation has been very much neglected in these hills. Trees have been allowed to grow almost wild. A good orange tree yields 5,000 to 10,000 oranges per year, but these oranges are so small that they sell 500 per rupee in the season. Would it not be much better to have fewer oranges of better quality, say 1,000 at 1 anna each? To obtain this result a different treatment from what is now being given to fruit trees in Kalimpong will have to be adopted. More seedlings and grafts of a better type must be used.

Peaches.—These trees thrive and fruit profusely, but only hard, small, unripe peaches are produced suitable for cooking purposes. The effect of root pruning is phenomenal, in one year ripe luscious fruits being produced. This practice must be demonstrated and a better variety of peach must be introduced, where a large export may be expected from this hillside. I tried to introduce cherry grafts from Switzerland with a view to growing them on the wild stock out here. The first attempt has been a failure, but the late Mr. J. Lister of Pashok was of the opinion that an early ripening variety would graft very well on local stocks in these hills.

Plantains thrive well in Kalimpong. Vegetables also grow luxuriantly both in the rains and in the dry season. In winter it is only necessary to arrange a supply of water to grow heavy crops of vegetables. Potatoes can be grown, but when nearly ripe they are attacked and destroyed by the redant. It only remains for us to find a cheap remedy and preventive for this pest to introduce a flourishing industry on this hillside. The most important point I wish to lay stress upon is the necessity of preserving continuty in the management on this farm. On this depends entirely the success of work on paddy, fruit and vegetables. Yields of paddy can be increased to 30 maunds per acre. We have just acquired the fruit garden of a well-to-do inhabitant of Kalimpong, the condition of which proves conclusively that the ordinary person up here knows nothing at all about fruit culture. The garden was overcrowded with trees, each of which was in a hopeless condition so far as fruit production is concerned. It will be interesting to note the effect of a few years of proper treatment.

F. SMITH,

Deputy Director of Agriculture.

The 4th August 1916.

Shows, etc.—On account of the war, through want of funds, few agricultural exhibitions were held in Western Bengal, but very good mêlas were held at Suri, Banjetia and Meherpur and some useful work was done at the Hetampur and Sekedda shows. These mêlas should receive all the help that the Agricultural Department can give.

Seed stores.—Each of the Superintendents of Agriculture had a seed store at Howrah and Sealdah respectively which enabled him to deal quickly with any demands made upon him for seeds, manures and implements. The seed stores have helped the Superintendents very materially with their district work.

Agricultural Associations.—The two divisional associations and the various district associations subsidiary to them continued to help in making known the recommendations of the Department. These associations form a good nucleus round which to build up district work. With the assistance of a good district agricultural officer each association should eventually become a real live-body, some of the members being really interested in agriculture and only requiring individual attention to carry out definite work. Even if unwilling to perform practical work themselves, some of the members hold positions of trust and position in the district and command respect from many of the cultivators. They can thus help the district staff to get into touch with raiyats in a friendly way.

The Department attended all meetings held in Western Bengal.

Jute Forecast work.—In the Burdwan Division 11 jute clerks were specially employed from 15th May to 13th September in addition to the 5 permanent demonstrators in checking jute areas and schedules from president panchayets.

In the Presidency Division there were 13 special jute clerks in addition to the six permanent men for this work.

Seed supply—Bankura.—For the rabi sowings, 1915-16, in Bankura we obtained the loan of 12 men of the demonstrator class under Babu Kiran Chandra Sen Gupta, Superintendent, Seed Store, Dacca, from Eastern Bengal, with a view to distributing seeds of rabi crops throughout the district as it was thought that on account of the heavy showers in November rabi sowings would be possible. A demonstrator was sent to each thana and the District Magistrate, Mr. A. W. Cook, I.C.S., arranged to provide loans for the purchase of seed. Bankura, however, is not a rabi district, and the small amount of rain that fell was not sufficient to ensure a rabi crop. Very few people could be induced to sow, and the majority of people preferred to use their money in buying good grain to tide them over till this year. A little seed was distributed by these demonstrators. The demonstrators, however, were fully employed in checking crop areas and outturns in the various thanas.

ANNUAL REPORT OF THE CHINSURAH FARM FOR THE YEAR ENDING 30th JUNE 1916.

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Introduction.

I. This farm of 210 acres, the soil of which is typical of the Hooghly district of the Burdwan Division, is well suited to jute and winter paddy in years of normal rainfall. In addition to experiments on these two crops a large area has now been allotted for demonstration of approved methods for the production of pure seeds of jute and paddy varieties and of sugarcane cuttings for distribution in the division and the Province. Pure-line cultures of jute and paddy varieties have also been taken up under the guidance of the Fibre Expert and the Economic Botanist, Bengal, and it is hoped that the farm will be in a position before long to supply improved local varieties of both paddy and jute.

The water-storage areas of the farm are receiving attention, as experience has shown that the jute and paddy seed-bed areas could not be drained if there were abnormal rains in May and June. The storage of water under

existing conditions was also too scanty to allow of irrigation to paddy, not to speak of rabi crops, potatoes or sugarcane that come on later in the year. The very important sugarcane experiment—a comparison of Java and Desi methods—demonstrated that without a good supply of water the Java system cannot be introduced.

The year under report was favourable for jute, but unfavourable for paddy. Transplanting was not possible before August, and there was no rain after September, the growing season being thus very short.

Situation and brief history.

II. The farm is situated to the west of the East Indian Railway line between the Chinsurah and Hooghly stations. It is only 38 inches above sea-level. The station was opened in 1908 and is representative of the Hooghly district.

Irrigation.

III. The farm has to depend entirely on rainfall.

The oil-engine pump did not work successfully. It is too small.

Area.

IV. The area is 210 acres, of which about 180 acres are under actual cultivation, the remainder being occupied by the steading, roads, channels, tanks and jhils.

Soil.

V. The soil is mostly a clay loam and is representative of the Gangetic alluvium on the western side of the Hooghly. The soil is fertile and capable of growing good crops.

The following table shows analyses of the soil and sub-soil of this farm :—

	High land, soil No. 1 A, Lab. No. 144.	High land, sub-soil No. 1 B, Lab. No. 145.	Block A, soil (field No. 2 A) Lab. No. 146.	Block A, sub-soil 2 B, Lab. No. 147.	Medium soil, No. 3 A, Lab. No. 148.	Medium sub-soil No. 3 B, Lab. No. 149.	Low land soil Field No. 4 A, Lab. No. 150.	Low land sub-soil No. 4 B, Lab. No. 151.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Insoluble silicate and silica	77·25	...	71·20	...	67·00	...	63·38	...
* Combined water and organic matter.	5·29	...	5·05	...	8·33	...	9·59	...
Ferric oxide and alumina ...	14·77	...	20·14	...	21 48	...	22·84	...
Lime	·96	...	1·53	...	1·00	...	1·57	...
Magnesia	·31	...	·26	...	·55	...	1·75	...
Potash	·85	1·63	1·29	1·22	1·31	1·17	1·51	1·01
Soda	·55	...	·39	...	·27	...	·27	...
†Phosphoric anhydride ...	·02	·15	·12	·10	·06	·12	·09	·12
Total	100·00	...	99·98	...	100·00	...	100·00	...
* Containing nitrogen ...	·09	073	·091	·088	·091	·064	·134	·122
† Containing phosphoric anhydride soluble in 1 per cent. citric acid solution.	·014	...	016	...	·005	...	·007	...

Meteorology.

VI. The rainfall was 7 inches below normal. Up to June the amount was satisfactory and left nothing to be desired, but the June total was only half the normal and prevented puddling before the end of July. July, August and September were satisfactory, but after that practically nothing fell and we had to depend on the water in the plots to bring the crop to maturity.

Accordingly great care had to be taken to conserve all the water in the plots and prevent percolation. As it was, we only obtained an 8-anna crop (50 per cent.).

The following table shows the average normal rainfall and the number of rainy days recorded on the farm during the year under report:—

	Inches.		Normal. Inches.
1915.			
January	·26	on 2 days	·38
February	·34	„ 1 day	1·2
March	4·73	„ 10 days	1·58
April	·48	„ 1 day	2·46
May	4·78	„ 11 days	5·85
June	5·67	„ 13 „	10·56
July	10·88	„ 12 „	11·28
August	9·74	„ 15 „	11·64
September	10·19	„ 18 „	8·40
October	3·45	„ 9 „	4·09
November	·76	„ 4 „	·66
December	Nil	...	·19
	51·28	on 96 days	58·29
1916.			
January	Nil	.....	Nil
February	Nil	.....	Nil
March	Nil	.....	Nil

The season was good for jute, as the preparation of land was easy in March and April. There was good rain in May, and no excessive rains fell in June. For paddy, however, the season was very bad as puddling was not possible before the end of July, and the season was very dry from the end of September. The year was a good one for cane and bad for rabi crops. It is more than ever evident now that irrigation facilities must be provided, to enable us to carry out real experimental work.

Temperature.

VII. The table below shows the average monthly maximum temperature in Fahrenheit in the open and in shade on the farm for the year:—

Month.	Inside.		Outside.		Godown.	
1915.						
April	93	81	104	78	113	72
May	100	84	105	79	...	...
June	93	82	100	82	...	...
July	86	80	94	79	104	76
August	88	82	95	82	100	75
September ...	87	81	90	81	97	79
October ...	83	81	95	78	101	77
November ...	81	73	89	82	98	72
December ...	73	64	81	58	90	60
1916.						
January ...	74	59	79	57	88	52
February ...	76	64	85	57	93	56
March ...	89	75	96	72	109	69

VIII. *Scientific work done during the year*:—(1) Aman dhan—Winter rice (*oryza sativa*); (2) Jute—*Pat*—(*Corchorus*); (3) Sugarcane—*Ak*—(*Saccharum officinarium*)—(1) Paddy—*A.*—Seed selection; *B.*—Varieties; *C.*—Manures; *D.*—Methods of cultivation.

A.—Seed selection.—This work is entirely under the control of the Economic Botanist. The farm will grow on a practical scale anything he recommends when he is ready.

B.—Varieties.—A number of varieties were grown as per table below. Amongst others, we grew Dacca No. 1, selected out by the Economic Botanist (previously called indursail) at Dacca. The results corroborate those previously obtained on this farm and are in favour of Nagra, the chief local variety of paddy grown in the Hooghly district. It was obviously an unfavourable year for Dacca No. 1 selected, which will be again grown this year on a larger area.

The outturns on small and large areas are given below. The experience is that the larger the area the smaller the average outturn and *vice versâ*. One apparently cannot go wrong with Nagra. It is a heavy yielder, and when selections have been made by the Economic Botanist from this stock we shall have a variety that will attract all the cultivators of the Hooghly district. We have already obtained outturns of 40⅝ maunds per acre on acre blocks :—

General crop statement, 1915-16.

Crop and variety.	ACTUAL FIGURES OF CULTIVATION.									
	Area in acres.	Expenditure.	Outturn. Grain.	Outturn. Straw.	Value.	Profit.	Loss.	Outturn. Grain.	Outturn. Straw.	Profit or loss.
Paddy.		Rs. A. P.	Md. S. Ch.	K. P. G.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Md. S.	K. P.	Rs. A.
C. P. fine *Aus* ...	2·58	133 5 0	5 6 14	1 11 11	28 6 0	...	104 15 0	2 0	0 9	-40 11
Kartickshal ...	1·00	37 0 0	14 10 0	1 15 12	58 5 9	21 6 0	...	14 10	2 0	21 6
Jatakaima ...	1·00	48 11 0	7 3 4	0 13 1	27 13 6	...	20 13 0	7 3	0 13	-20 13
Jhingashal ...	1·55	92 2 0	26 3 0	2 2 12	96 12 0	4 10 0	...	16 17	1 6	3 0
Indursail ...	1·00	34 6 2	11 34 0	1 0 12	44 4 9	9 14 6	...	11 34	1 1	9 14
Sadasamba ...	1·00	54 0 7	10 0 0	2 11 16	50 6 6	...	3 10 0	10 0	2 12	- 3 10
Banktulsi ...	1·01	44 2 7	3 31 12	0 6 18	15 2 6	...	29 0 0	3 30	0 7	-28 11
Nagra	54·15	2,914 7 6	954 27 1	102 1 10	3,960 2 0	1,045 10 0	...	17 25	1 14	19 5
Hatishal	5·95	293 7 11	86 25 2	8 8 17	328 11 9	35 4 0	...	14 22	1 7	5 15
Dadkhani	4·30	215 1 9	44 18 4	4 13 7	180 3 9	...	34 14 0	10 13	1 2	- 8 2
Kataribhog ...	6·94	306 0 0	103 26 0	11 1 16	416 4 3	110 4 0	...	14 37	1 10	15 14
Kaminishal ...	·80	47 12 7	14 10 0	1 11 13	59 4 9	11 8 0	...	17 33	2 3	14 6
Badshabhog ...	4·90	251 10 7	43 22 0	5 4 17	187 13 9	...	63 13 0	8 36	1 1	-13 0
Samudrabali ...	5·62	271 8 7	73 7 8	8 11 13	311 3 9	39 11 0	...	13 1	1 8	7 1
Pure-lines ...	2·00	...	...	...	...	...	...	...	...	...
Total ...	93·80	3,743 12 3	1,398 24 13	153 3 15	5,764 15 0	1,021 3 0	...	15 9	1 11	11 2

A

Experiment.	Total cost per acre.	Profit or loss per acre.	Outturn per acre. Grain.	Outturn per acre. Straw.	Total value.	Remarks.
Varieties.		Rs. A. P.	Md. S. Ch.	K. P. G. / Md. S. Ch.	Rs. A. P.	
Nagra ...	42 10	44 15 0	23 14 0	2 2 6 / 22 39 0	87 9 0	(2).
Sadasamba ...	42 10	10 0 6	10 25 0	2 12 10 / 45 24 0	52 10 6	(6).
Kataribogh ...	43 1	15 8 6	14 5 8	1 10 16 / 18 19 8	58 9 6	(5).
Badshabhog ...	43 6	-1 5 6	9 22 0	1 4 6 / 14 17 8	42 0 6	(8).
Dadkhani ...	43 1	7 9 6	12 31 8	1 7 17 / 15 12 0	50 10 6	(7).
Indursail ...	42 10	39 6 6	22 3 0	1 13 6 / 21 9 0	82 0 6	(3)
Samudrabali ...	43 6	25 15 6	16 10 8	1 14 12 / 21 37 0	69 5 6	(4).
Hatisal ...	43 1	79 2 6	33 39 0	1 15 8 / 26 20 0	122 3 6	(1).

B. Varieties.—The table below shows the average outturn per acre of 9 different varieties of winter paddy, the first 5 of which were being tried for six successive years:—

Serial number.	NAME OF VARIETY.	AVERAGE OUTTURN PER ACRE IN MAUNDS.													
		1909-10. Favourable rainfall.		1910-11. Transplanting very late.		1911-12. Scanty late rains.		1912-13. Favourable rainfall.		1913-14. Favourable rains, except at the late stage.		1914-15. Transplanting late and late rains deficient.		1915-16. Late transplanting and short season.	
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
1	Dadkhani ...	19¾	24	9⅜	16¼	17⅕	25¾	18½	23⅛	26¼	30	7⅛	31⅓	72¾	...
2	Badshabhog ...	20⅛	35	12½	17½	20¾	37	16⅞	26¾	28¼	47⅞	11	31⅛	9¼	...
3	Banktulsi ...	18½	29½	9¼	15⅝	18¼	31¼	21⅜	31⅜	25⅝	43¾	5⅝	35 1/10	34	...
4	Hatishal ...	19	26⅜	10¾	16⅝	12⅞	36	22	36⅜	23⅞	39¼	14½	33½	23¼	...
5	Nagra ...	29½	32⅛	9	16⅓	19⅛	29¾	21½	34⅞	31¼	34⅛	11⅛	42⅜	22	...
6	Indursail ...	...	...	...	...	...	...	...	...	...	...	13⅛	37 1/10	14	...
7	Kataribhog ...	...	...	...	...	...	...	...	...	...	...	8¾	31	16¼	...
8	Samudrabali ...	...	...	...	...	...	...	...	...	...	...	11½	14⅝	...	...
9	Sadasamba ...	...	...	...	...	...	...	...	...	...	...	...	...	10⅛	...

The yields obtained on large areas in 1913 are very interesting and instructive at this stage:—

Variety.	Area in acres.	1913. Average outturn per acre.	1914. Area.	1914. Yield.
		Mds.	Acres.	Mds.
Nagra	63·24	29¾	45·4	13¾
Banktulsi	16	23	...	...
Badshabhog	1·8	20⅜	13½	11
Dadkhani	6·4	18⅜	...	...
Dacca No. 1 selected ...	...	...	⅔	14

The statement below shows the highest outturns obtained on acre plots and on larger areas:—

Plot No.	Variety.	Area in acres.	1913. Outturn per acre.	1914. Area.	1914. Yield.
			Mds.		Mds.
Block A 15—19/B ...	Nagra ...	1	40⅝	1	26¼
,, 9—13/C ...	,, ...	1	35 1/10	1	24¾
,, 9—13/B ...	,, ...	1	34⅞	1	25½
,, 3—7/C ...	,, ...	1	34¼	1	27
,, 21—25/B ...	,, ...	1	34	...	...
,, 3—7/B ...	,, ...	1	32½	...	...
Block D, F line ...	,, ...	2	39	...	...
,, A line ...	Dadkhani ...	4	19¾	...	...

* There is not much difference in values. Four annas per maund more is offered for fine varieties like Dadkhani, Kataribhog and Badshabhog, while the coarsest varieties bring 2—4 annas less per maund than medium varieties like Nagra. Aus paddy is not suited to this farm. Kartiksal and Jatakalma

are Burdwan varieties that require a short growing period. They mature very rapidly and are not suited to Chinsurah. Sadasamba is the famous Coimbatore paddy that yields such heavy crops. It is not suited to Chinsurah. It requires plenty of water and a long growing season. We should call it deep water paddy in Bengal.

C. Manures.—(1) Series I—General.
(2) Series II—Nitrate of soda.
(3) Series III—Green manure.
(4) Series IV—Conservation of cowdung.
(5) Series V—Potash manures.

Series I.—General.—The table below shows the different manures with the quantities used compared against an unmanured plot. The experiment was carried out in triplicate on one-fifth area plots. The results are the averages of these three plots and Nagra paddy was used :—

1	2			3			4
EXPERIMENT.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost per acre.	Profit or loss per acre.	OUTTURN PER ACRE. Quantity. Grain.	Straw.	Total value.	REMARKS.
						K. P. G.		
Paddy—Manurial— 1	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. CH.	Mds. S. CH.	Rs. A. P.	
(a) Nil	45 14 9	.....	45 14 9	24 10 0	18 22 11	1 12 13 *23 9 3*	70 8 9	(6)
(b) Cowdung, 100 mds. per acre...	46 11 9	6 4 9	53 0 6	38 1 10	24 20 7	2 0 2 *36 34 13*	91 2 4	(3)
(c) Cowdung, 100 mds. per acre... Bonemeal, 2 ,, ,, ...	56 3 9	12 1 12	67 5 8	30 8 2	26 17 11	2 14 14 *30 1 4*	97 13 10	(4) $\frac{1}{5}$th acre in triplicate.
(d) Cowdung, 100 mds. per acre Am. sulphate, 1 md. ,,	48 14 4	14 12 6	63 7 10	38 5 4	27 31 4	2 2 4 27 3 5	101 13 2	(2)
(e) Cowdung, 100 mds. per acre Bonemeal, 3 ,, ,, Am. sulphate, 1 md. ,,	50 2 11	22 2 10	72 5 9	26 15 10	26 28 12	2 4 5 *26 15 10*	99 5 7	(5)
(f) Bonemeal 3 mds. per acre Am. sulphate. 1 md. ,,	48 8 9	15 12 10	64 5 7	21 14 5	22 33 6	2 1 9 *16 32 11*	86 4 0	(8)
(g) Bonemeal, 3 mds. per acre	48 9 8	8 5 10	56 15 6	23 8 10	21 26 7	1 13 6 *22 0 7*	80 8 4	(7)
(h) Dhaincha green-manured ...	47 0 9	10 11 8	57 12 5	52 15 7	29 13 12	2 11 11 *36 26 4*	110 12 0	(1)
(i) Super, 3 mds. per acre ... Nitrolim, 1 md. ,, ...	49 13 4	19 2 3	69 0 0	17 7 9	22 33 11	2 2 0 *24 20 7*	86 7 9	(9)

Dhaincha green manure is the most economical application with an increased outturn of nearly 11 maunds (902 lbs.) of grain per acre. Cowdung *plus* sulphate of ammonia give an increase of 9 maunds (738 lbs.), while cowdung alone gives an increase of 6 maunds (492 lbs.) of grain over the unmanured plot.

I give below previous results for information and reference :—

Serial No.	MANURE PER ACRE.	AVERAGE OUTTURN PER ACRE IN MAUNDS. 1909-10. Grain.	1909-10. Straw.	1910-11. Grain.	1910-11. Straw.	1911-12. Grain.	1911-12. Straw.	1912-13. Grain.	1912-13. Straw.	1913-14. Grain.	1913-14. Straw.	1914-15. Grain.	1914-15. Straw.	1915-16. Grain.	1915-16. Straw.
1	Unmanured	27½	36	13⅜	21	13⅜	19⅜	21¼	29½	24¼	32½	14½	26½	18½	23¼
2	Cowdung, 50 maunds	28¼	38⅜	18¾	21½	25⅝	35¼	24⅜	33	29⅜	40¼	...	...	...	...
3	,, 100 ,, ...	31⅜	47⅞	18	20½	18½	25⅞	23 3/16	37½	32⅛	43⅝	16¾	28½	24½	26¾
4	,, 50 ,, ... Super, 3 ,, ... Saltpetre, 1 ,, ...	33	52½	18½	23¾	22½	33	25½	34½	33¾	41⅛	...	...	...	...
5	Bonemeal, 3 ,, ... Saltpetre, 1 ,, ...	30¼	50	17¼	26½	18⅛	42⅜	25 1/16	34⅛	31¼	33	...	...	...	...
6	*Dhaincha* green-manured	26¼	34⅜	24½	26½	16⅝	23	29⅛	46½	29⅜	34¾	18½	33⅜	29¼	36½
7	*Sunn* hemp green-manured	24½	30½	27	30	16½	23½	29½	38⅜	28¼	35½	...	...	...	...
8	Nitrolim, 2 maunds	...	...	...	...	...	...	27⅞	37¼	33⅝	38	...	...	...	...
9	Castor-cake, 5 ,, ...	...	...	...	...	...	...	24 7/16	34	33¾	40⅜	...	...	...	...
10	Unmanured	30	42½	14½	16½	19	28½	22⅝	30½	23⅜	28⅜	...	...	...	...

Dates of transplanting—1915.
1914.
1913—July 27th.
1912—July 14th.
1911—July 14th.
1910—August 30th.
1909—July 27th.

Manure per acre.	Cost of manuring.	Outturn per acre, 1914.		Outturn per acre, 1915.	
		Grain.	Straw.	Grain.	Straw.
	Rs. A. P.	Mds.	Mds.	Mds.	Mds.
1. Nil	...	14⅓	25½	18½	23¼
2. Cowdung, 100 maunds ...	11 8 0	16¾	28½	24½	26¾
3. Cowdung, 100 „ ... / Bonemeal, 3 „ ...	20 14 0	20⅞	41	26½	30
4. Cowdung, 100 „ ... / Ammon. sulph., 1 maund	21 1 10	46	...	27¾	27
5. Cowdung, 100 maunds ... / Bonemeal, 3 „ ... / Ammon. Sulph., 1 maund	32 3 0	20⅓	29¼	26¾	26¼
6. Bonemeal, 3 maunds ... / Ammon. sulph., 1 maund	24 15 0	17⅓	30	22¾	16¾
7. Bonemeal, 3 maunds ...	15 13 0	16½	22¾	21¾	22
8. Dhaincha, sown at 6 seers and green manured.	...	18¼	33¾	29¼	36½
9. Nitrolim, 1 maund ... / Super, 3 maunds ...	54 0 0	16⅓	39½	22¾	24½

Manures—Series II—Nitrate of Soda.—This series was started to see if there was anything in the old figures of the Burdwan Farm with Indian saltpetre which, to say the least, were phenomenal. Japanese and Madras results of recent years have been distinctly unfavourable to the use of Nitrate for paddy. Government allowed me to go to Madras to study the question on Mr. Harrison's plots, where I found that conditions under which paddy is grown where Harrison's standard work has been done, are totally different to those obtaining on millions of acres of paddy land in Western Bengal. In Madras the paddy crop grows in water from transplanting to harvesting. Even at harvest time the land is soft mud. In West Bengal, however, paddy is a dry-land crop from October onwards.

At one time I did not consider it advisable to push Indian saltpetre in the districts as a manure for paddy as I found it was so easily adulterated with common salt, that it was generally sold in the bazar without a guarantee of percentage of nitrogen or purity and that it varied so much in composition. This would obviously lend itself to cheating if any demand occurred. These last two years, however, Nitrate of soda or Chilean saltpetre is obtainable on the Indian market, and the case is now quite different. Nitrate of soda is always procurable on a guaranteed purity and percentage of nitrogen.

The following table gives details of the manures and quantities applied with yields and other details of expenditure The plots were 1 acre in area and nagra variety was used :—

Experiments.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost per acre.	Profit per acre.	Outturn per acre. Quantity. Grain.	Outturn per acre. Quantity. Straw.	Outturn per acre. Total value.	Remarks.
Manurial 2	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Md. S. Ch.	K. P. G.	Rs. A. P.	
(*a*) Nil	32 14 6	...	32 14 6	25 14 3	14 27 6	1 13 10	58 12 9	(3)
(*b*) Sodium Nitrate, 1 md. per acre.	33 7 0	5 0 9	38 7 9	42 15 0	21 17 8	2 1 0	81 6 9	(1)
(*c*) Calcium Nitrate, 1 md. per acre.	33 4 3	6 0 9	39 5 0	24 2 0	16 19 6	1 11 5	63 7 0	(4)
(*d*) Cowdung, 100 mds. per acre.	34 6 9	6 13 7	41 4 4	37 15 2	19 30 0	2 10 0	79 3 6	(2)

1 acre plots.

The table below shows the results for the past two years :—

Manure per acre.	Cost of manuring.	Outturn per acre			
		1914.		1915.	
		Grain.	Straw.	Grain.	Straw.
	Rs. A. P.	Mds.	K. P. G.	Mds.	K. P. G.
Nil	...	17⅘	3 11 0	14½	1 13 10
Sodium nitrate, 1 maund ...	6 8 3	21	2 14 9	21½	2 1 0
Calcium do., 1 do. ...	5 10 9	22⅝	2 13 14	16½	1 11 5
Cowdung, 100 maunds ...	...	...	...	19¾	2 10 0

The increase attributable to the use of nitrate of soda is nearly 7 maunds (574 lbs.).

The price of nitrate of soda has now increased to Rs. 180 per ton or about Rs. 7 per maund, but I am reliably informed the manure will be procurable after the war at Rs. 5-8 per maund (82 lbs.), at which price all people, shippers, importers and merchants included will be able to make a fair profit.

Manures.—Series III.—Green manures alone versus *Green manures with the addition of artificials.*—The table below gives details, but results are not very convincing :—

Experiments.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost per acre.	Profit or loss per acre.	Outturn per acre.		Remarks.
					Quantity.	Total value.	
					Grain. Straw.		
Manurial 3	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Md. S. Ch. K. P. G.	Rs. A. P.	
(a) Unmanured Dhaincha green manured to paddy.	39 9 10	5 12 0	45 5 10	11 ~ 2	13 14 0 { 1 8 14 / 15 25 12 }	56 1½ 0	(1)
(b) Dhaincha manured with Basic slag 336 lbs. and Muriate of Potash, 168 lbs. per acre. green manured to paddy.	39 9 6	54 2 0	93 11 6	38 2 0	12 34 8 { 1 10 0 / 16 3 12 }	55 9 6	(2)

Manures.—Series IV.—Conservation of cowdung.—This is to compare the value of carefully conserved cowdung with cowdung thrown in a heap anywhere. The figures are not very convincing, although in favour of conservation. The table explains itself :—

Experiments.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost per acre.	Profit per acre.	Outturn per acre.			Remarks.
					Quantity.		Total value.	
					Grain.	Straw.		
Manurial 4	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A P.	Md. S. Ch.	K. P. G.	Rs. A. P.	
(a) Farm cowdung, 60 mds. per acre.	42 3 3	3 3 3	45 6 6	9 7 6	13 15 4	1 8 15	54 14 0	(1)
(b) Raiyats' cowdung, 60 mds. per acre.	41 11 5	3 13 0.	45 8 5	5 9 11	12 25 12	1 6 4	51 2 4	(2)

1914.

	Outturn.
Farm cowdung	8⅘ maunds.
Raiyats' ditto	8¼ ,,

Series V.—Potash Manures.—Results of experiments made with potash manures on paddy, 1914-15 :—

Manures.	Outturn per acre, maunds of 82 lbs.		Value of outturn per acre.	Cost of cultivation per acre.	Profit per acre.
	Grain.	Straw.			
Paddy, variety Kartikshal (Manure per plot 16 acres). lbs.			Rs. A. P	Rs. A. P.	Rs. A. P.
1. Oil-cake ... 40 Sulphate of Ammonia ... ... 14 Super ... ... 28 Muriate of Potash 10	20¾	38	61 8 9	43 13 6	17 11 3
2. Oil-cake ... 40 Sulphate of Ammonia ... ... 14 Super 28	20¼	35	59 10 0	41 14 3	17 11 9
3. No manure	10½	16	30 4 4	17 10 1	12 10 3
4. Sulphate of Ammonia ... ... 14 Muriate of Potash 10	20	32½	55 14 6	30 13 5	25 1 1

The above experiments were carried out in 1914, but not in 1915. The results are interesting, although no direct effect of potash is noticeable between plot No. 1 and plot No. 2. Sulphate of ammonia and muriate of potash, however, gives as good a result as the complete manuring of plot No. 1.

D. *Methods of cultivation—*

(1) Quantity of seed in seedbed.
(2) Number of seedlings per hole.
(3) Distance apart of transplanting.
(4) The kind of plough.
(5) Time of ploughing.
(6) Rotation.

The following tables explain what has been done. I do not know that anyone can lay down hard-and-fast rules for these different methods of cultivation. It is best to leave the local cultivator to carry out his own practice, as local conditions vary so much in every district. Even in the same village water will accumulate in some plots a month or two before others.

Suffice it to say that it is a good thing to have good strong seedlings ready in plenty of time. Early in the season 1 or 2 seedlings transplanted 10 inches apart are quite sufficient, but if the season is late it may be best to use 4 seedlings close together. In any case, it is a waste to use 6, 8 or 10 seedlings per hole. The time of ploughing depends on the amount of moisture in the soil, while the local plough is satisfactory. Jute rotates well with paddy, provided early rains fall or irrigation can be given and the jute is well forward in May :—

Experiment result.

Experiment.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost per acre.	Profit or loss per acre.	Outturn per acre. Quantity. Grain.	Outturn per acre. Quantity. Straw.	Outturn per acre. Total value.	Remarks.
Paddy (1).	Rs. A. P.	Rs. A. P	Rs. A. P.	Rs. A. P.	Mds. s. c.	K. P. G. Mds. s. ch.	Rs. A. P.	
Method— 3								
(a) Seed bed rate, 20 seers per bigha.	...	...	44 15 2	67 0 11	30 29 13	2 2 18	112 0 1	(1)
(b) 30 seers per bigha ...	...	...	42 3 1	42 11 12	22 22 6	18 23 12 2 1 0	84 15 0	(4)
(c) 40 ditto ...	...	...	38 14 5	52 12 11	24 16 13	25 28 8 2 3 9	91 11 4	(2)
(d) 80 ditto ...	...	...	44 10 6	50 14 6	25 8 10	28 0 0 2 6 8	95 9 0	(3)
Paddy (2).						51 8 7		
Demonstration— 1								
(a) 2 seedlings, 15th August	...	...	49 11 4	15 3 5	16 36 12	1 11 11	64 14 9	(1)
(b) 4 ditto ditto ...	...	...	77 9 3	24 12 9	12 19 1	1 15 5	52 13 2	(4)
(c) 4 ditto 30th August	...	...	58 12 7	5 11 10	13 18 6	1 8 15	53 0 9	(3)
(d) 8 ditto ditto ...	...	...	57 5 3	3 4 2	13 10 9	1 5 7	54 1 1	(2)

D.—(1) *Seedling Experiment.—Object*—To find out what number of seedlings per hole 10 inches apart gives the highest yield.

The transplanting of one, two, and three seedlings per hole 10 inches apart was compared during the last five years. It has been observed that one seedling gives the best results only when transplanting is done early in July, as may appear from the table under transplanting in different weeks. The conflicting results in certain years are accounted for by the fact that transplanting was late in those years.

The following table shows the average results during the period :—

Number of seedlings per hole.	Average outturn per acre in maunds, 1909-10.		Outturn per acre in maunds, 1910-11.		Average outturn per acre in maunds.					
					1911-12		1912-13.		1913-14.	
	Grain.	Straw.	Grain.	Straw	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
1	31⅜	33¾	8⅛	9¼	19	39	20½	21¼	23	39
2	25½	31¾	12	14½	16	31⅛	22	27	24¾	30
3	24½	28¾	13⅞	16¼	17⅛	36⅛	30⅜	38½	30	39⅛

One seedling and three or four seedlings were compared on acre blocks in 1912-13 with the following result :—

	Grain in maunds.	Straw in maunds.
1 seedling	34	45
3 or 4 seedlings	27	29

(2) *Seedlings—Date of Transplanting.—Object*—To determine the latest date for the transplanting of one seedling per hole to be successful, an experiment was started in the previous year (1912-13), and the results shown below are striking and explain the unsuitability of the one seedling method after the close of July :—

Year.	Produce.	Outturn per acre (in maunds) of one seedling transplanted 10 inches apart in—						
		First week of July.	Second week of July.	Third week of July.	Fourth week of July.	First week of August.	Second week of August.	Third week of August.
1912-13 ...	Grain	32¼	27¾	22	24½	21¼	18⅜	17¾
	Straw	34	32	27	26	23⅛	21¾	18¼
1913-14 ...	Grain	36½	30	29½	30½	25	16	14½
	Straw	47¾	36½	39¾	35½	29½	18¾	17⅛

(3) *Spacing Experiment.—Object*—To find out what is the best distance apart to transplant rice.

The results in 1909-10 and 1911-12 went to show that one seedling 10 inches apart gave the best outturn. In 1912-13 three spacings—6 inches, 12 inches and 14 inches—with one seedling per hole were tried with about equal results. So in the year under report three spacings—10 inches, 14 inches and 18 inches—were experimented with, and the number of seedlings per hole increased proportionately in the cases of the longer spacings.

The tables below show the average results from duplicate plots :—

Serial No.	Spacing.	Number of seedlings per hole.	1913-14. Outturn per acre in maunds.	
			Grain.	Straw.
	Inches.			
1	10	1	26⅜	33¼
2	14	2	23	25⅛
3	18	3	23⅛	25¼

Thus a spacing of 10 inches, with one seedling per hole, is the best distance apart in years of normal transplanting.

2. *Seedlings.*—To test the difference in the use of varying numbers of seedlings per hole for transplanting at different periods, the figures are embodied in the table below :—

Date of transplanting.	Number of seedlings used per hole.	Outturn per acre in maunds, 1914-15.	
		Grain.	Straw.
15th July	2	12⅜	37¾
15th „	4	14	37½
15th August ...	2	10⅜	51
15th „ ...	4	9¾	52¾

The deficient rainfall during August-October (4·65 inches below normal) lowered the outturns badly, as in the cases of all crops during the year, but it is quite clear that two seedlings transplanted by the middle of July is always economic and best paying.

3. *Spacing.*—This was a compound experiment to find out economic spacing and number of seedlings to be transplanted per hole according to the time of transplantation. The results may be seen below—

Distance apart transplanted.	Number of seedlings used per hole.	Date of transplanting.	Outturn per acre, 1914-15.				
			Grain.		Straw.		
			Mds.	S.	K.	P.	G.
8 inches ...	2	15th July ...	24	20	3	1	0
12 „ ...	2	15th „ ...	26	20	3	0	0
8 „ ...	4	15th „ ...	26	10	3	1	5
12 „ ...	4	15th „ ...	26	12	3	1	16
8 „ ...	2	15th August ...	9	0	1	14	10
12 „ ...	2	15th „ ...	10	36	2	4	0
8 „ ...	4	15th „ ...	10	0	2	4	10
12 „ ...	4	15th „ ...	9	25	1	12	12

In the year under report with the rainfall from August-October (4·65 inches below normal), 4 seedlings transplanted 8 inches apart on 15th July has given the best results. But it must always be borne in mind that all these details entirely depend on weather conditions, which are the controlling power by which the spacing and number of seedlings are to be fixed according to date of transplanting. The excess or deficiency of late rains will, however, play an important part in the final fate of the crop.

4. *Time of ploughing.*—To compare the results from ploughing the land at the earliest opportunity after the last harvest with ploughing in April-May. The results, as shown below, appear to be in favour of the latter practice :—

Time of ploughing.	Outturn of grain per acre.		
	1914.	1915.	
	Mds.	Grain.	Straw.
Ploughing immediately after harvest	10	16½	21¼
Ploughing in April-May ...	10¾	19¼	19

Kind of plough.	Total cost of cultivation per acre.	Outturn of grain per acre.		
		1914.	1915.	
	Rs. A. P.	Mds.	Grain.	Straw.
Local	26 12 6	7	15½	19¼
Hindustan	27 6 3	7½	18¼	21¾

Conclusions on Paddy work.

1. *Variety.*—This depends on local conditions which vary not only in each locality, but in each village. No doubt much improvement will ensue from careful selection from the best variety in the locality, and this means very long and careful work by a well trained staff.

2. *Manures.*—This is the part of our work which offers most chance of success. Many manures can be recommended when the people are ready to spend money, and cheap credit is available.

3. Methods of cultivation are controlled entirely by local conditions, but generally speaking there is no necessity to use too much seed in the seedbed nor to employ more than 2-4 seedlings in holes 10 inches apart in transplanting.

Jute—

A.—Seed selection.
B.—Varieties.
C.—Manures.
D.—Methods of cultivation.

A.—Seed selection by pure-lines is being carried out under the guidance of Mr. Finlow, Fibre Expert, on this farm, and his report must be consulted for details. It has been proved beyond doubt that for the ordinary crop grown in this district the Olitorius variety is a better yielder than the Capsularis. This corroborates local practice where Hooghly deshi, an Olitorius variety, is the most popular. Mr. Finlow is now engaged in selection work on Olitorius varieties on this farm.

B. Varieties.—The following table shows what varieties have been tried with the results obtained :—

Crop and variety.	Actual figures of cultivation.							Average per acre.		Profit or loss.
	Area in acres.	Expenditure.	Outturn, seed.	Outturn, fibre.	Value.	Profit.	Loss.	Outturn, seed.	Outturn, fibre.	
JUTE—		Rs. A. P.	Mds. s. ch.	Mds. s. ch.	Rs. A. P.	Rs. A. P.	Rs. A.	M. s.	M. s.	M. s.
Belgachia No. 4	·89	68 1 0	...	9 16 0	64 10 0	...	3 7	...	11 30	4 5
Kakya Bombai No. 7 ...	7·67	667 15 1	14 4 9	87 16 8	721 12 0	53 12 11	...	...	11 16	7 0
Barapat	·58	35 15 10	3 21 14	...	28 6 0	...	7 10	6 4	...	13 2
Dhaleswar	·51	47 1 0	...	5 38 12	41 0 6	...	6 0	...	11 29	11 12
Deswal	·50	29 8 9	2 28 8	...	21 15 3	...	7 9	5 17	...	15 2
Total for Capsularis Jute	10·06	848 9 8	20 14 15	102 31 4	877 11 9	29 2 0	...	10 20	10 9	2 14
Tosha	4·00	339 9 1	6 27 8	67 11 8	588 5 9	248 13 0	...	1 27	16 33	62 3*
Red deshi	17·07	1,635 2 0	5 22 3	294 26 1	2,312 15 9	677 13 9	...	0 13	17 3	39 11
Total for Olitorius Jute ...	21·07	1,974 11 1	12 9 11	358 37 9	2,901 5 6	926 10 9	...	0 23	17 0	44 0
Pure-lines	1·00	...	...	...	...	...	...	...	...	...
Total for Jute	32·13	2,823 4 9	32 24 10	461 28 13	3,779 1 3	955 12 9	...	...	13 25	26 15

* Failed on low land.

The above are "practical" areas. I have purposely left out figures for small areas with very high outturns which are very misleading. On some small plots we obtained 27 to 30 maunds per acre.

The following is a comparison of two recommended Capsularis varieties and Hooghly deshi.

Experiment Results.

Experiment.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost of cultivation per acre.	Profit or loss per acre.	Outturn per acre. Quantity. Seed.	Outturn per acre. Quantity. Fibre.	Outturn per acre. Total value.	Remarks.
			Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. .	Rs. A. P.	
JUTE—								
Varieties—Red deshi ...	...	...	86 11 6	23 7 6	...	14 8 12	110 3 0	Olitorius is the best for Chinsurah.
Belgachia No. 4	...	...	85 1 3	4 4 9	...	11 30 0	80 12 6	
Kakya Bombai No. 7. ...	...	...	101 6 0	19 12 9	3 11 10	8 5 0	81 9 3	

NOTE.—The Superintendent by mistake gathered seed from Kakya Bombai, which must have lowered the outturn of this variety.

Hooghly Deshi was the best yielder.

Kakya Bombai on a small area (2 acres) when even grown on the land that could be sown first (one month earlier than other plots) is not much better than the average outturn of Hooghly Deshi on 17 acres. Here Kakya Bombai No. 7 yielded 18¾ maunds per acre, but when included in the whole area of 7⅔ acres, the average for this variety only works out at 11¼ maunds per acre.

C.—Manures—

Series I.—General.
,, II.—Potash manures.
,, III.—Nitrate of soda.
,, IV.—Castor-cake.

The tables explain themselves :—

Jute.

Experiment.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost of cultivation per acre.	Profit or loss per acre.	Outturn per acre. Quantity. Seed.	Outturn per acre. Quantity. Fibre.	Outturn per acre. Total value.	Remarks.
SERIES I.								
Manurial 1	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. C.	Rs. A. P.	
(1) Nil	95 8 0	...	95 8 0	63 5 3	...	20 19 8	158 13 3	(3) Too high.
(2) Cowdung, 100 maunds per acre.	98 2 8	5 8 4	103 11 0	71 14 3	...	22 26 4	175 9 2	(1) ¼th acre in duplicate.
(3) Castor-cake, 10 maunds per acre.	101 12 7	33 12 7	135 9 2	67 0 1	...	27 4 6	202 9 3	(2)
(4) Cowdung, 50 maunds per acre. Super, 3 maunds per acre Saltpetre, 1 maund per acre.	106 12 10	23 14 8	130 11 6	56 15 6	...	24 8 12	187 11 0	(4)
SERIES II.								
Manurial 2								
(1) Nil	87 6 4	...	87 6 4	72 7 6	...	23 25 0	159 13 10	(2)
(2) Cowdung, 100 maunds per acre.	73 2 11	6 12 6	79 15 5	66 0 3	...	18 36 2	145 15 8	(4)
(3) Muriate of potash, 100 lbs. per acre. Super. 100 lbs. per acre. Am. sulph., 50 lbs. per acre.	87 4 10	24 0 0	111 4 10	43 11 2	...	20 0 0	155 0 0	(5) Ditto.
(4) Super, 100 lbs. per acre. Am. sulph. 50 lbs. per acre.	88 8 6	10 4 7	98 13 1	90 1 5	...	24 15 0	188 14 6	(1)
(5) Muriate of potash, 100 lbs.	78 3 8	13 14 9	92 2 5	67 11 1	...	20 25 0	159 13 6	(3)
SERIES III.								
Manurial 3								
(1) Nil	79 15 6	...	79 15 6	32 10 6	...	14 21 4	112 10 0	
(2) Cowdung, 80 maunds per acre.	75 6 3	5 14 7	81 4 10	38 9 3	...	15 18 12	119 14 0	
(3) Sodium Nitrate, 1 maund per acre.	90 8 9	5 0 10	95 9 7	63 0 7	...	20 18 12	158 10 2	
(4) Calcium Nitrate, 1 maund per acre.	79 6 3	6 5 10	85 12 1	41 11 4	...	16 17 13	127 7 5	
SERIES IV								
Demonstration— 4								
(a) Cowdung manuring, 100 maunds per acre.	81 1 11	6 10 0	87 11 11	93 10 7	...	23 16 4	181 6 6	Red deshi.
(b) Castor-cake, 6 maunds per acre.	77 4 4	20 3 6	97 7 10	91 10 8	...	24 16 4	189 2 6	1-acre plots.

In Series I and II the unmanured plot is very high—first, castorcake; second, cowdung, super and saltpetre; third, super and sulphate of ammonia; and fourth, cowdung are the most economical applications in these series.

In Series III the unmanured plot is more like what it ought to be, and the outstanding feature is the result obtained from an application of 1 maund of nitrate of soda per acre.

Series IV shows good results for both cowdung and castorcake.

There is no crop that responds to manuring like jute. Its quick growth and bulk demand plenty of nourishment in an available form. General manures are always safe, but artificial manures must be applied intelligently or they will give no effect. Cowdung, castorcake, superphosphate and sulphate of ammonia should be applied at the time of sowing the seed, while nitrate of soda and Indian saltpetre should be applied as a topdressing at sowing time.

D.—Methods of Cultivation—

(1) Thinning.
(2) Weeding.

(1) *Thinning.—Distance apart.*—Thinning out to 4 or 5 inches apart gives the best results :—

Experiment Result.

Experiment.	Cost of cultivation per acre.	Cost of manure per acre.	Total cost of cultivation per acre.	Profit per acre.	Outturn per acre. Quantity. Seed.	Outturn per acre. Quantity. Fibre.	Total value.
Demonstration.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Mds. S. C.	Mds. S. CH.	Rs. A. P.
Jute—Thinning (*a*) 2 to 3 inches apart ...	...	...	102 3 2	52 12 10	...	20 0 0	155 0 0
(*b*) 4 to 5 „ „ ...	...	...	128 11 0	41 13 0	...	22 0 0	170 8 0

Conclusions.—(1) Experience shows that the best seed is Hooghly deshi so far. It is hoped that an improved type may be obtained from this variety.

2. The crop requires heavy manuring, and there are many suitable manures.

Sugarcane.—We compared the Java method of cultivation with the local method. The Java system requires plenty of available water for irrigation up to May when water is very scarce. The cost of the construction of trenches is very heavy.

Good crops of the Mauritius and Barbadoes varieties were grown and 117,520 cuttings were produced on the farm for distribution purposes.

Dhaincha.—It does not pay to grow dhaincha for seed on this farm. An yield of 5½ maunds per acre was obtained. Good dhaincha seed can be purchased locally in November at Rs. 4-8 to Rs. 5 per maund :—

Crop.	Area.	Cost of cultivation	Cost per acre.	Yield per acre.	Price of seed per maund.
		Rs. A. P.	Rs.	Mds. S.	Rs.
Dhaincha seed ...	5·00	135 2 2	27	5 27	5

9. *Distribution of seeds.*—The following seeds were distributed from the farm store during the period under report :—

	Mds.	
Jute, Tosha	4	
„ Kakya Bombai	5¼	
„ Red Deshi	4¼	
Jute seed, chiefly Kakya Bombai and Deswal ...	45	(sent to Dacca).
Paddy seed, Nagra	17¼	
„ Badshabhog	12	
„ Samundrabali	11½	
„ Dadkhani	8¼	
„ Kataribhog	7½	
„ Hatishal	4¼	
„ Indursail	2¼	
„ Jhingsal	7	
„ C. P. Aus	2¼	

10. *Practical training of young men.*—Nineteen young men with fair educational qualifications, received practical training on the farm during the year. Each student received an allowance of Rs. 15 per month and free quarters.

11. *Receipts and Expenditure*—31st March 1916.

Receipts.

	Rs.	A.	P.
Total remittances to treasury during the year ...	13,186	14	7
Bills receivable ...	609	7	0
Valuation of seed grains in stock based on market rate	1,209	7	0
Total ...	15,005	12	7

Expenditure.

	Rs.	A.	P.
Capital expenditure (apprentices' quarters threshing floor, drains, roads, tanks, etc. ...	13,300	0	0
Wages of labourers and cost of all other contingencies	13,288	0	0
Cost of management and supervision	3,566	11	7
Cost of training of young men (apprentices) ...	1,543	0	9
Total ...	31,697	12	4

12. *Visitors.*—A few landed gentlemen and cultivators visited the farm during the year. All enquiries and instructions regarding agricultural matters were duly attended to. The Collector and the District Judge paid two visits to the farm each.

13. *Management and inspection.*—Babu Chuni Lal Mustafi was Superintendent in charge of the farm during the year.

Babus Biswesswar Chatterjee, Harendra Chandra Bose and Birbar Chottoroy, the three Overseers, gave satisfaction in their work.

The farm was inspected by me at frequent intervals throughout the year and was also inspected by the Director of Agriculture (2), Agricultural Chemist (3), Economic Botanist (3), Fibre Expect (3).

F. SMITH,

Deputy Director of Agriculture.

ANNUAL REPORT OF THE AGRICULTURAL STATION, BURDWAN, FOR THE YEAR ENDING 30th JUNE 1916.

Introduction—
(1) Area and soil.
(2) Soil analysis.
(3) Irrigation and drainage.
Meteorology.
Operation of the year—
(1) Demonstration work—
A.—Paddy.
B.—Jute.
C.—Potatoes.
D.—Sugarcane.
(2) Conservation of Cowdung.
(3) Distribution of seeds.
(4) Practical training of students.
Management.
Appendix—I—Farm Account, 1915-16.

ANNUAL REPORT OF THE BURDWAN FARM OF THE YEAR ENDING 30th JUNE 1916.

SOME useful work was done on this farm during the year. The site lies 3 miles south-east of the civil station of Burdwan. The station was

established in 1885 and much experimental work has been done. When I first took charge in 1904-05 only a small area was cultivated and the experimental plots were very small. Very heavy crops of paddy, jute, sugarcane, and potatoes were obtained on these small areas of $\frac{1}{16}$th of an acre which, when multiplied out as yields per acre, made very heavy outturns. One would have thought all neighbouring raiyats would have immediately followed the lead of the farm but when I went from village to village I found that such was not the case. As I went from district to district I was struck with the general poorness of the crops in comparison with those we were growing on our small plots. A study of the average outturns per acre of the whole Province showed further that the average for the large area was 50 per cent. to 100 per cent. less and sometimes 200 per cent. less than the yields from these small areas.

I concluded something was wrong somewhere, and during the past seven years I have always carried out work on acre blocks before making any definite recommendations, as yields from small areas are misleading. It is a very simple matter to arrange for irrigation and drainage facilities on a small area, but when one comes to deal with large areas it is extremely difficult and would mean in many cases very heavy capital expenditure to obtain such facilities. The rainfall then becomes the dominant factor, and this is a very variable quantity. These points require careful consideration before taking up district work, and we are doing this work chiefly on this farm during the last four years.

Experimental results have been carefully recorded and can be referred to by interested people at any time in the old annual reports.

We have now increased the cultivated area at this farm to about 30 acres, which is about what our assistants can energetically manage, and when I obtain increased outturns of 50 to 75 per cent. on 2—3 acres of any crop by any definite improvement, I am satisfied it is practical and can be recommended.

The more experience I get in this Province the more I am convinced that manures and manuring is the chief improvement that can be definitely recommended by the Agricultural Department. I believe improved seeds of paddy and jute will be possible in Bengal only by long careful work by specialists, and this will have to be done locality by locality, while as to implements and methods of cultivation new innovations will be a very slow process indeed, unless something extraordinary arises to turn an agricultural community into an industrial one.

We can introduce a new crop altogether, such as groundnuts, and I strongly recommend this crop for very large areas in Birbhoom, Burdwan, Bankura and Midnapore.

In India in 1898-99 there were 200,000 acres of this crop, while in 1912-13 the area was 1$\frac{1}{3}$rd million acres. The bulk of the crop is grown in Madras. In Bengal there is practically speaking none, but it is well worth consideration. Last year we grew 10$\frac{1}{2}$ maunds of groundnuts per acre on land that had previously been considered to be too barren to grow crops. There is a very large area of similar land in the above-mentioned districts suitable for this crop.

Area of the farm is 32 acres.

Soil.—The soil is a poor sandy loam. The following is an analysis of average samples of soil and subsoil of the whole farm :—

	Soil. 1st 9."	Subsoil. 2nd 9."
Insoluble silicate and sand	88·52	87·47
Ferric oxide	3·60	3·68
Alumina	4·42	5·27
Lime	·34	·33
Magnesia	·34	·31
Potash	·31	·32
Soda	·09	·07
Phosphoric acid	·02	·03
Sulphuric acid	·01	·01
Carbonic acid	·04	·06
Organic matter and combined water	2·31	2·45
Total ...	100·00	100·00
Available photash	·04	·02
Ditto phosphoric acid	·002	·001
Nitrogen	·011	·007

The above figures denote that the land is exceedingly poor in nitrogen and phosphoric acid and poor in lime, but possibly contains enough potash.

Irrigation and Drainage.—This farm is irrigated from the Eden Canal running along side of it. Part of the area, about 20 acres, can occasionally be irrigated by flow during the rainy season, provided the main Damodar River is fed by flood. For the rest of the season the lands are irrigated by three or more lifts.

Consequently irrigation operations become very costly. Farm crops suffer often from absolute want of water. The farm is very well drained when the canal is low.

Meteorology.—The following table gives the normal rainfall at the Burdwan civil station and the actual rainfall recorded on the farm :—

Name of month.	1915-16.		Normal.	
	Actual rainfall in inches.	Number of rainy days.	40 years.	Rainy days.
1915.				
April	0·86	3	2·20	3
May	3·91	7	5·56	6
June	11·64	12	10·17	12
July	10·79	9	12·32	15½
August	2·67	5	11·49	15
September	5·51	13	8·59	11
October	7·43	10	3·93	4
November	1·08	3	0·64	¾
December	*Nil*	*Nil*	0·13	¼
1916.				
January	*Nil*	*Nil*	0·38	¾
February	*Nil*	*Nil*	0·89	1½
March	*Nil*	*Nil*	1·24	1¾
Total ...	43·89	62	57·54	71½

The abnormal rainfall in August 1915 (viz., 2·67 inches against 11·49 inches normal) was very unfavourable for the jute crop and also to paddy crop in its infancy, but the rain in October and November helped very much and made the season favourable for paddy.

Operations of the year—

(1) Scientific work.
(2) Conservation of cowdung.
(3) Distribution of seeds.
(4) Practical training of apprentices.

(1) *Scientific work.*—Demonstration work on the following crops was carried out during the year under report :—

A.—Paddy.
B.—Jute.
C.—Potatoes.
D.—Sugarcane.
E.—Groundnuts.

A.—Paddy—

(1) Seed selection.
(2) Variety.
(3) Manures.
(4) Methods of cultivation.

(1) *Seed selection.*—Mr. Hector is taking up work this year at this farm :—

Serial No.	NATURE OF SEEDS.	Area in acre.	Actual outturn.	Outturn per acre.	Value of outturn per acre.	Cost of cultivation per acre.	Profit.
			Mds. S.	Mds. S.	Rs. A. P.	Rs. A. P.	
1	Farm selected seed ...	1	Gr. 22 20 St. 58 20	22 20 58 20	80 8 3	29 11 6	50 12 9
2	Raiyats' non-selected ...	⅛	Gr. 3 10 St. 7 20	19 20 45 0	68 10 0	25 7 0	43 3 0

* Seed selections were made by water test (Japanese method).

(2) *Variety.*—After many trials we have found that Jatakalma Kartiksal is the most suitable variety of paddy for this land.

Here are figures for a small test we made on four varieties this year :—

Serial No.	VARIETIES.	Area in acres.	Actual outturn.	Outturn per acre.
			Mds. S.	Mds. S.
1	Jatakalma Kartiksal ...	⅛	Gr. 3 8 St. 7 20	25 24 60 0
2	Kartiksal	⅛	Gr. 3 12 St. 7 10	26 16 58 0
3	Basmati	⅛	Gr. 3 4 St. 6 30	24 32 54 0
4	Badshabhog	⅛	Gr 2 36 St. 6 20	23 8 52 0

(3) *Manures.*—This is the chief work carried out at this farm. The table explains the different manures, quantities applied, yields obtained and economical results on practical areas :—

Serial No.	Manures per acre.	Area in acres.	Actual outturn.	Outturn per acre.	Value of outturn per acre.	Cost of cultivation.	Profits.
	PLOT NO. A.		Mds. S.	Mds. S.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	Cowdung (Farm 60 mds. pitted + 1 md. Nitrate of Soda.	1	Gr. 26 24 St. 61 0	26 24 0 61 0 0	92 13 0	39 11 6	53 1 6
2	Raiyats' cowdung 60 mds. + 1 md. Nitrate of Soda.	2	Gr. 43 20 St. 88 20	21 30 0 44 10 0	75 8 0	39 11 6	35 12 6
	PLOT NO. B.						
1	Green manured with Dhaincha.	1½	Gr. 37 35 St. 85 0	25 10 0 56 26 10	88 11 10	23 12 9	64 15 1
2	Unmanured ...	3	Gr. 46 15 St. 72 20	15 18 5 24 6 8	50 6 2	22 1 0	28 5 2
3	Bonemeal 3 mds. + 1 md. Saltpetre.	3	Gr. 77 20 St. 142 25	25 33 5 47 21 8	88 2 6	39 7 8	48 10 10

These results corroborate all previous experimental work on this farm. and we can recommeud for paddy on this farm and for West Burdwan. Birbhum, Bankura and high land of Midnapore the following economical applications :—

1st.—Dhaincha, green manure.
2nd.—Bonemeal, 3 maunds
Saltpetre, 1 maund } per acre.
3rd.—Cowdung, 60 maunds
Nitrate of Soda, 1 maund } per acre.

The following test was made on $\frac{1}{6}$th of an acre plots and corroborates what has been said above. Sulphate of Ammonia is equally good as Nitrate of Soda as a top-dressing for paddy :—

1.—Paddy.

Serial No.	Manure per acre.	Area in acres.	OUTTURN— Actual.	OUTTURN— Per acre.	Value of outturn per acre.	Cost of cultivation per acre.	Profit.
			Mds. sr.	Mds. sr.	Rs. A P.	Rs. A. P.	Rs. A. P.
1	Cowdung, 60 maunds ...	$\frac{1}{6}$	Gr. 3 20 St. 7 12	21 0 43 32	66 3 8	30 11 0	35 8 8
2	Cowdung, 60 maunds ... Saltpetre, 1 maund ...	$\frac{1}{6}$	Gr. 4 5 St. 8 20	24 30 51 0	85 15 0	40 9 0	45 6 0
3	Cowdung, 60 maunds ... Sulphate of Ammonia, 1 maund.	$\frac{1}{6}$	Gr. 4 11 St. 9 10	25 26 55 20	89 6 0	40 9 0	48 13 0
4	Cowdung, 60 maunds ... Nitrate of Soda, 1 maund	$\frac{1}{6}$	Gr. 4 7 St. 8 20	25 2 51 0	86 13 0	40 9 0	46 4 0
5	Cowdung, 60 maunds ... Castor-cake, 6 maunds ...	$\frac{1}{6}$	Gr. 4 12 St. 8 10	25 32 49 20	88 9 0	44 11 0	43 14 0
6	Bonemeal, 3 maunds ... Nitrate of Soda, 1 maund	$\frac{1}{6}$	Gr. 4 15 St. 8 12	26 10 49 32	89 0 0	47 5 0	41 11 0
7	Bonemeal, 3 maunds ... Saltpetre, 1 maund ...	$\frac{1}{6}$	Gr. 4 12 St. 9 20	25 32 57 0	90 7 0	47 5 0	43 2 0
8	Bonemeal, 3 maunds ... Sulphate of Ammonia, 1 maund.	$\frac{1}{6}$	Gr. 4 18 St. 9 30	26 28 58 20	92 7 8	47 5 0	45 2 8
9	No manure ...	$\frac{1}{6}$	Gr. 2 22 St. 4 2	15 12 24 12	50 11 0	25 13 0	24 14 0

(4) *Methods of cultivation*—

(1) Ploughs. | (2) Rotation.

(1) *Ploughs.*—The following demonstration was carried out with different kind of ploughs showing the superiority of Hindustan and Meston ploughs on light soil. (We keep Meston ploughs in our stock for supply to the cultivators at cost price):—

Serial No.	Treatment.	Area in acres.	OUTTURN— Actual.	OUTTURN— Per acre.	Value of outturn per acre.	Cost of cultivation.	Profit.
			Mds. sr.	Mds. sr.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	Hindustan ...	$\frac{1}{3}$	Gr. 8 35 St. 15 20	26 25 46 20	89 4 6	39 1 0	49 9 6
2	Meston	$\frac{1}{3}$	Gr. 8 15 St 15 10	25 5 45 30	85 11 6	39 11 0	46 0 6
3	Local	$\frac{1}{3}$	Gr. 8 2 St. 14 30	24 6 44 10	82 8 0	39 11 0	42 13 0

(2) *Rotation.*—Paddy in rotation with jute in the same year.—During the period under report 19¼ maunds of grain of paddy and 33¾ maunds of straw were obtained per acre after a crop of 18¾ maunds jute. This rotation is possible when rain or irrigation allows of jute being well forward in the month of May.

B.—*Jute.*—3·65 acres of jute were grown and an average outturn of 18¾ maunds were obtained. Generally farm-grown seed is used. When jute is rotated with paddy, an early ripening variety is best—generally *capsularis*, but when the crop is allowed to occupy the land as long as it requires, an *olitorius* variety is most suitable. Cowdung at the rate of 150 maunds per acre was applied.

The following is a small test we made with four varieties :—

Varieties.	Area in acres.	Actual outturn.	Outturn per acre.
		Mds. sr.	Mds. sr.
1. Kakya Bombai ...	1·11	19 10	17 13
2. Serajganj ...	·41	7 10	17 28
3. Mr. Finlow's jute ...	·24	3 30	15 25
4. Tosha of Pabna ...	·40	7 13	18 12

C.—*Potatoes.*—

(1) Varieties. | (2) Manures.

(1) *Varietal demonstration.*—This demonstration was made to show the superiority of imported seeds to the local ones. The following table gives the figures :—

Varieties.	Area in acres.	Actual outturn.	Outturn per acre.	Remarks.
		Mds. sr.	Mds. sr.	
1. Darjeeling ...	$\frac{2}{9}$	54 20	245 10	Treated with—castor-cake 10 maunds, Super 22 lbs.. Nitrate of Soda 300 lbs. per acre.
2. Katni ...	$\frac{2}{9}$	43 15	195 7	
3. Nainital ...	$\frac{2}{9}$	22 5	99 22	

The Darjeeling variety is generally most popular in provincial markets. It is a heavy yielder.

(2) The following manurial demonstration was made with Darjeeling potatoes and with the following results :—

Serial No.	Manure per acre.	Area in acre.	Outturn— Actual.	Outturn— Per acre.	Yield value per acre.	Cost of cultivation.	Profit.
			Mds. sr.	Mds. sr.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1	No manures ...	$\frac{1}{30}$	3 5	93 30	169 14 9	241 14 0	...
2	Castor-cake 10 maunds, Super 200 lbs., Nitrate of Soda 300 lbs.	$\frac{2}{9}$	54 20	245 10	444 8 3	319 10 3	124 14 0
3	Castor-cake 20 maunds	$\frac{1}{9}$	20 0	180 0	326 4 0	296 13 9	29 6 3

The general manure amongst growers is 20—30 maunds of castor-cake per acre. This shows that half the castor-cake can be well replaced by a mixture of nitrate of soda and superphosphate.

D.—Sugarcane.—The varietal demonstration was made with sugarcane of the following varieties :—

(1) White Tanna of Mauritius.
(2) Punri, Samsara and Khari.

The results of two successive years prove that Mauritius cane is suitable for Burdwan and other districts where scarcity of water is felt almost every year, provided irrigation can be given. It is also interesting to note that high flood like that of 1913 did not affect the crop.

The following table gives the figures of outturn of different varieties :—

Serial No.	Varieties.	Outturn per acre.	Value of outturn per acre.	Cost of cultivation per acre.	Profit or loss	Remarks.
		Mds. s.	Rs. a.	Rs. a. p.	Rs. a.	
	Newly planted—					
1	White Tanna ...	96 20	603 2	318 6 0	284 12	
2	Local ...	42 0	262 8	365 9 6	Loss.	Soft canes required more attention, and hence the cost exceeds.
	Ratooned—					
1	White Tanna ...	84 0	525 0	257 3 0	267 13	Soft canes suffered much from drought.
2	Local ...	24 0	150 0	272 6 9	Loss	Di to.

The figures are very definite and represent exactly what we have obtained with Mauritius and Barbadoes canes in comparison with local varieties in Bengal, where manures and irrigation facilities were available these last ten years.

E.—Groundnuts were grown on a small area of land, formerly full of kans grass and considered barren. The land was ploughed and cleaned and seed was sown in the rains in June. Seed was dibbled 2—3 together in holes 1 foot apart on rows 18 inches apart. The land was cultivated by means of the Planet Junior hand hoe. Seed rate, 20 seers per acre. Outturn, 10 maunds per acre. The crop was very much neglected and harvested in November—December.

(2) *Conservation of cowdung.*—Storing of cowdung in pits is now beginning to be appreciated by the local cultivators. Here are the figures from a cultivator's field. The effect is noted on paddy :—

Nature of collecting cowdung.	Yield per acre, paddy.	Value of yield per acre.	Manures.
		Rs. a.	
(1) Cowdung in kutcha pit with a thatched shed.	Gr. 32-10 ... St. 2 kahans ...	106 11	Treated with 7½ cartloads or 60 mds. per acre and 6 mds. castor-cake per acre.
(2) Cowdung heaped and exposed to sun and rain.	Gr. 28-20 ... St. 1 kahan + 8 pan ...	91 12	

(3) This farm endeavours to supply all demands made upon it for seeds and seed cuttings.

During the period under report the following seeds and sugarcane cuttings were supplied to the cultivators :—

Paddy seeds	...	Jatakalma ... Kartiksal ...	10 maunds.
Ditto	...	Kartiksal ...	5 Do.
Jute seeds	...	C. capsularis ...	¼ maund.
Dhaincha seed	...	....	¼ Do.
Sugarcane cuttings	...	White Tanna ...	23,000 pieces.
Ditto	...	Khari	6,000 do.

(4) *Practical Training of students.*—One student received training during the period under report.

Management.—The expenses of the farm are borne by the Maharajadhiraj Bahadur of Burdwan, to whom thanks are given. The entire management is in the hands of the Agricultural Department, and Babu Jogendra Charan De was the Superintendent in charge of the farm throughout the year.

The Deputy Director of Agriculture, Bengal, made frequent inspections. The Director visited the farm twice. The Economic Botanist and the Agricultural Chemist also visited the farm during the period under report.

APPENDIX I.

Farm Accounts, 1915-16.

Receipts.

	Rs.	A.	P.
Raj contribution ...	2,500	0	0
Deposited into treasury on account of sale proceeds ...	1,619	2	9
Stock in hand and bills receivable	1,000	6	9
Total ...	5,119	9	6

Expenditure.

	Rs.	A.	P.
Bills payable	996	7	0
Establishment ...	678	10	0
Capital	32	5	0
Extra labour	2,327	10	6
Manures	183	15	0
Cattle food	126	0	6
Contingencies ...	152	4	6
Office expenses ...	3	9	9
Implements	18	6	0
Stamps	4	0	0
Seeds	83	4	6
Rent	30	1	0
Total ...	4,636	9	9

F. SMITH,

Deputy Director of Agriculture.

ANNUAL REPORT OF THE KALIMPONG FARM, 1915-16.

Contents.

1. Situation and History.
2. Area and elevation.
3. Irrigation.
4. Soil.
5. Meteorology.
6. Operation during the year—
   - *A* General crop.
   - *B* Experimental work.

A.—Outturns and economic values.

B.—(*a*) Maize.
- (*b*) Winter rice.
- (*c*) Autumn rice
- (*d*) Kodo.
- (*e*) Buckwheat.
- (*f*) Soybeans.
- (*g*) Miscellaneous.
- (*h*) Fruit.
- (*i*) Pineapples.

(*a*) Maize—(1) Seed selection.
(2) Varieties.
(3) Terracing for maize.

(*b*) Rice—(1) Varieties.
(2) Effect of elevation.
(3) Manures.
(4) Cost of cultivation, 1915.

(*d*) Maruā or Kodo—(1) Rotation with maize.
(2) Cost of cultivation.

(*e*) Buckwheat—(*a*) Varieties.
(*b*) Cost of cultivation.

(*h*) Fruit culture.

(*i*) Pineapples.

7. Receipts and Expenditure.
8. Acknowledgments and Training.
9. Seeds distributed.
10. Management.

ANNUAL REPORT OF THE DEMONSTRATION FARM, St. ANDREW'S COLONIAL HOMES, KALIMPONG, FOR THE YEAR 1915-16 (BY HENRY EDMUNDS, MANAGER).

Situation and History.—The village of Kalimpong is the headquarters of the subdivision of Daling (a Government Estate of 401 square miles). The district was ceded to the British Government after the Bhutanese War of 1864-65. The settlement of the estate restricts the ownership of land to hill tribes, and at the same time makes provision by which Lepchas and Bhutias are only allowed to dispose of their land amongst themselves. This condition was introduced to prevent the more thrifty and enterprising Nepalese from becoming possessors of all the land in the district, which would to a great extent have been the case had no steps been taken to prevent it.

All transfers of land go through the Khas Mehal office, and an annual ground rent of annas 6 to Re. 1-4 per acre is charged by Government.

Kalimpong has a fairly large bazar and is the mart for produce of a considerably large area in addition to which it is the centre of Tibetan trade with Bengal.

It is only 11 miles by road from the nearest railway station, Kalimpong Road, a station on the Siliguri-Tista Valley Extension, Darjeeling-Himalayan Railway.

The Demonstration Farm is situated below the bazar on the easterly slope, which runs down to the Rilli river, a tributary of the Tista, joining the latter at Riang.

Although about 24 acres of land had been cultivated by the Homes prior to April 1907, the remaining portion was not taken over from the native cultivators until December of that year; so it was not till the beginning of 1908 that a proper start was made.

During the first two years much of the time was spent in preparatory works, such as erection of farm buildings, boundary pillars, fencing and convenient roads. A few experiments, however, were carried out with various crops.

2. *Area, Elevation.*—A survey of the farm was completed in April 1911 at a cost of Rs. 136-0-6. The plots were all numbered and the area computed. The total area, exclusive of jhoras, is 60·78 acres, of which 9·54 are occupied with roads, houses, farm buildings, waste ground and under trees and bamboos, leaving 51·24 acres for cultivation. During the year under report 24 acres were under experimental cultivation, the remainder being partly cultivated under ordinary crops and partly given to coolies on half crop system. The elevation is as follows :—

	Feet.
Lower boundary	3,317
Farm buildings	3,793
Upper boundary	3,864

The level section through the farm from top to bottom shows an average gradient of 1 to 5. This is a very moderate slope for these hills, and gives a situation difficult to improve on for experimental work.

3. *Irrigation.*—The only irrigation necessary for the rice crop is obtained from the natural rainfall, and this consists of turning the water out of the many streams on to the rice terraces when required. In the winter no irrigation is possible, but few crops grow at that season. For vegetables in winter it will be necessary to irrigate.

4. *Character of the soil.*—The soil is a rich clay loam, whose reaction is acid.

5. *Meteorology.*—The following table shows the normal rainfall for 7 years and that of 1915 at the Demonstration Farm :—

Month.	Normal seven years.		1915.	
	Rainfall.	Rainy days.	Rainfall.	Rainy days.
1915.	Inches.		Inches.	
January	0·38	1·7	Nil	Nil
February	1·20	4·01	3·0	8
March ...	2·08	6·01	1·14	10
April	2·91	13·01	1·19	9
May	6·23	17·3	8·01	24
June	20·40	21·11	14·99	22
July	27·22	27·71	15·58	28
August	22·11	25·21	23·03	23
September	9·29	17·71	4·25	15
October	3·53	7·01	0·36	3
November	1·84	5·0	0·43	3
December	0·48	2·0	Nil	Nil
Total ...	97·67	145·78	71·98	145
1916.				
January	0·33	3	...	...
February	0·92	2	...	...
March	1·10	1	...	...

The season 1915-16 was very favourable to the maize and aus paddy crops, but very unseasonable for rice. marua, soybeans and buckwheat, *i.e.*, all other crops.

6. *Operations during the year.—A.—General crops grown.*—The following table gives the area under each crop grown by the farm, and on the half crop system, with the total outturn, yield per acre, price per maund (82 lbs.), and total value of crops and cost of cultivation :—

Crop.	Area in acres.	Outturn.	Yield per acre.	Cost of cultivation per acre.	Price per maund	Total value of crop.	Grand Total.
		Mds. srs.	Mds. srs.	Rs. A.	Rs. A.	Rs. A. P.	Rs. A. P.
Maize	19·65	575 19	29 10	36 0	3 14	2,229 0 6	2,505 9 6
½ Crop maize	7·75	72 20	9 14	Nil	3 14	276 9 0	
Paddy (aman)	15·13	271 26	18 0	39 0	3 0	814 15 0	1,083 13 6
Straw	15·13	434 4	28 27	Nil	0 9	244 2 6	
½ Crop paddy	0·62	6 30	10 35	Nil	3 0	20 4 0	
½ „ straw	0·62	8 0	12 36	Nil	0 9	4 8 0	
Kodo	4·75	99 0	21 2	45 0	3 8	346 8 0	510 8 0
„ ½ crop	5·65	46 34	8 11	Nil	3 8	164 0 0	
Ghaiya (or aus paddy) ...	1·0	24 15	24 15	46 0	3 0	73 2 0	90 4 0
„ straw	1·0	137 0	137 0	Nil	0 2	17 2 0	
Buckwheat	2·0	4 2	2 1	13 0	2 10	10 10 0	
Bhatmas (soybeans) ...	5·20	28 37	5 22	22 0	4 0	115 12 0	
Dal Kalai	3·0	13 2	4 14	23 0	5 8	71 10 6	
Sugarcane (gur) ...	0·53	24 0	45 7	105 0	10 0	240 0 0	
Gahat	1·0	11 30	11 30	29 0	3 2	36 11 6	
Potatoes	0·20	1 26	8 10	250 0	3 0	4 15 0	
Groundnut	0·25	2 0	8 0	70 0	7 0	14 0 0	
Khar (thatching grass) ...	1·05	105 0	100 0	15 0	0 8	52 8 0	
Wheat	2·40	Failure due to drought.		20 0	...	...	

From the above figures it is evident that maize and kodo in rotation are the most economical crops for these hill sides. Kodo, buckwheat, soybeans, kalai and other pulses are grown after maize on the same land in the one year, but none of the latter-named crops are so popular as kodo. Ghaiya or aus paddy also does remarkably well on very open slopes on these hills

when sown in rows. Aman paddy can also be cultivated on a profitable scale as has been proved this year from the results, if sufficient care is taken to see that irrigation is kept up constantly from the jhoras till the second week of October. It is also profitable to grow this on the half-crop system and it compares very favourably with maize and kodo; and as regards growing pulses, buckwheat, etc., on the half-crop system, it has been found to be disadvantageous as the returns are extremely poor.

B.—*Experimental Work*—

Primary ...	...	1. Maize. 2. Winter rice (*Aman dhan*).
Secondary	...	3. Autumn rice (*Aus dhan*). 4. Kodo. 5. Buckwheat. 6. Soybeans. 7. Miscellaneous.

B(1). Zea mays—maize—makai—bhutta.—In 1907-08 experiments were commenced with a view to improve the crops as grown in this district, and also to compare it with Jaunpur maize. The latter, after two years' trial with poor results, was continued. Attention was then concentrated on the improvement of the local varieties by means of seed selection

The maize at the commencement was of a very mixed nature, containing seeds of all colours and required seed-to-seed selection. The first few years' trials, however, separated the crops into several varieties, and by the subsequent selection of the best cobs of each type we have obtained five varieties fairly true to type, *i.e.*, yellow round, yellow flat, white round, white flat and red round.

The average outturn of maize on 8½ acres of all varieties under cultivation for the last few years is here given :—

	Per acre.			
	Mds.	srs.		lbs.
1909-10	21	21	or	1,764
1910-11	27	25	„	2,264
1911-12	30	9	„	2,478
1912-13	33	8	„	2,722
1913-14	33	30	„	2,767
1914-15	30	39	„	2,539
1915-16	31	36	„	2,615

These are remarkable figures and a striking illustration of the benefit to be derived from careful selection of seeds.

Seed was sown at the rate of 25 seers per acre between the third and fourth weeks of March, and manure applied at the rate of 175 maunds per acre. The crop was harvested from the beginning of the second week to the end of August. The proportion of grain to cobs with leaves attached was 51·55 per cent.

(*a*) *Varieties.*—The variety experiment has shown the following results :—

Variety.	Outturn.						
	1909.	1910.	1911.	1912.	1913.	1914.	1915.
Yellow round ...	19¼	29½	33¼	37	37½	33⅜	33⅝
„ flat ...	37¼	36¼	36	31	26⅞	22	29
White round ...	26¼	32⅜	33¼	29	33¼	37	35¼
„ flat ...	28¼	35½	29¾	41½	35	31¼	23⅜
Red round ...	19¾	30¼	31¼	37	30½	30½	36⅞

These outturns are from 1 acre blocks, and the figures backed up by the average for the farm require no comment.

(*b*) *Effects of terracing.*—To compare the result of growing ordinary crops (not irrigated paddy) on terraced and unterraced land, 2 acres were selected as uniform in fertility and slope as was possible to find on the farm. One acre was terraced at a cost of Rs. 107-5-6. Each plot received similar treatment, equal amounts of manure and seeds being applied.

The following table shows the outturn and cost of production of maize and secondary crops for the last five years :—

TERRACED ACRE.			UNTERRACED ACRE.		
Crop.	Outturn.	Cost of cultivation.	Crop.	Outturn.	Cost of cultivation.
1911-12.	Mds. srs.	Rs. a. p.	1911-12.	Mds. srs.	Rs. a. p.
Maize ...	33 5	40 1 3	Maize ...	38 32	41 11 0
Soybeans—			Soybeans—		
Grain ...	11 35	20 8 6	Grain ...	9 22	24 4 0
Straw ...	15 20		Straw ...	12 10	
1912-13.			1912-13.		
Maize ...	32 38	44 14 6	Maize ...	36 2	44 14 6
Kodo—			Kodo—		
Grain ...	22 10	49 6 3	Grain ...	24 20	52 15 3
Straw ...	Estimated Rs. 5.		Straw ...	Estimated Rs. 5.	
1913-14.			1913-14.		
Maize ...	30 0	37 10 0	Maize ...	35 20	37 10 0
Kalai—			Kalai—		
Grain ...	5 0	25 0 0	Grain ...	4 30	25 0 0
Straw ...	6 30		Straw ...	5 0	
1914-15.			1914-15.		
Maize ...	31 12	37 9 0	Maize ...	35 31	38 1 0
Buckwheat (local).	4 15	14 9 0	Buckwheat (local).	4 20	14 9 0
1915-16.			1915-16.		
Maize ...	34 20	33 5 0	Maize ...	40 14	33 8 0
Soybeans—			Soybeans—		
Grain ...	5 0	22 8 0	Grain ...	3 20	22 0 0
Straw ...	11 5		Straw ...	8 10	

During the five years of experiments maize has been grown on these plots in rotation with soybeans, kodo, kalai dal, and local buckwheat as secondary crops. So far the outturn of maize has been higher on the unterraced area.

It is interesting to note that the secondary crops, soybeans and kalai dal (pulses) gave higher yields on the terraced area, while kodo and buckwheat (cereals) gave a greater yield on the unterraced area.

(*c*) *Manurial experiment.*—Three plots of ½ an acre each have been reserved for this experiment since 1910-11. The condition of the soil in each plot is fairly uniform and the situation of each plot is approximately at the same level.

The following results were obtained in 1915-16 with maize and kalai dal in rotation :—

½-acre plots.	Manure per acre.	Outturn of Maize. per acre.	Outturn of Kalai dal. per acre.
		Mds. srs.	Mds. srs.
1.	100 maunds farmyard manure 2 maunds superphosphate	25 20	6 32
2.	100 maunds farmyard manure	26 0	5 12
3.	Unmanured	23 20	3 4

Since these manurial experiments have been carried out on the farm it has been proved that the application of farmyard manure alone is more economical and effective than artificial manures, the rainfall being so great at times that these artificial manures never seem to get any chance of doing justice to the crop. The experience of another year or two may yet demonstrate the value of artificial manures; otherwise it would be advisable to

discontinue their use as there will never be any likelihood of their adoption by the local cultivators.

The following are the details of cost of cultivation of 1 acre of maize :—

Date.	Particulars. 1915-16.	Cost. Rs. A. P.
1915.		
18th January	... First ploughing ...	3 0 0
13th February	... Breaking clods ...	1 15 0
16th ,,	... Manure and cost of spreading	13 0 0
23rd March	... Second ploughing ...	1 12 0
25th ,,	... Cost of seeds (25 seers) ...	2 3 0
25th ,,	... Breaking clods and covering seeds.	1 0 0
11th May	... First thinning and hoeing	3 0 0
9th June	... Second ditto ditto	2 6 0
27th August	... Harvesting, storing, etc. ...	4 6 0
1916.		
7th March	... Hulling, etc.	3 12 0
	Total ...	36 6 0
	Yield = 34 mds. 20 srs. at Rs. 3-14 ...	133 11 0
	Profit	97 5 0

Out of an area of 27·40 acres under maize cultivation during 1915-16, 19·73 acres were under the yellow round variety, which seems to be both the most profitable and popular with cultivators.

The white round variety is another favourite amongst the raiyats of this hillside.

Oryza sativa—Winter Rice—Dhan—Transplanted rice.—Owing to the proximity of this farm to the hill ridge a very limited space is left to act as a collecting ground for water, and the crop in consequence is almost entirely dependent on the incidence of rainfall during these months to ensure that continuous supply of water, which is so essential for its growth. The seed-beds are sown by the end of May; and transplanting commences by the end of June and is completed by the end of July.

The following table gives the area, outturn and yield per acre of each variety grown on this farm :—

Rice 1915-16.

Varieties of experiments.		Area.	Outturn.	Yield per acre.
		Acres.	Mds. Srs.	Mds.
Elevation	Touli	2·33	46 10	19¾
	,, ...	2·57	56 10	21¼
	,, ...	2·33	40 20	17¼
	,, ...	5·40	88 20	16⅜
Variety ...	Touli	0·25	4 27	18⅝
	Tatomasi	0·25	3 31	15⅜
	Mansaura	0·25	4 23	18¼
	Timurah	0·25	4 26	18½
	Ramtulsi	0·25	4 30	19
	Dhanasi	0·25	4 8	16¾
	Touli (nil)	·33	5 5	15⅝
	,, (G. M. soybean) ...	·33	4 20	13½
	,, (50 maunds cowdung) ...	·33	3 37	11¾

Touli (which gives a large whitish grain) is the best yielder on the farm; consequently most of the paddy area was under this variety. During the harvesting season of 1914-15 special attention was given to seed selection from the standing crop. A careful watch was also kept over the "jhoras" during the season, and this, in spite of the adverse season for paddy, enabled us to beat all previous records of yields.

(*a*) *Effects of elevation.*—In 1915 an area of 5·4 acres situated at the lowest elevation of the farm was taken over from the coolies who had been

cultivating this area since the establishment of the farm and included in our khas cultivation. We now intend to compare the outturns of paddy at various elevations, and the statement below in course of time should give us an idea what altitude in these hills best suits this crop:—

Elevation Experiment.

Serial No.	Area in acres.	Approximate elevation.	Variety.	Outturn in grains.	Yield per acre.	Total cost of cultivation.
				Mds.	Mds.	Rs. A.
1	5·40	3317′—3450′	Touli	$\frac{88\frac{1}{2}}{139\frac{1}{4}}$	$\frac{16\frac{3}{8}}{24\frac{3}{4}}$	213 4
2	4·90	3500′—3650′	,,	$\frac{96\frac{3}{4}}{140\frac{5}{8}}$	$\frac{19\frac{3}{4}}{28\frac{1}{4}}$	194 2
3	2 33	3600′—3750′	,,	$\frac{46\frac{1}{4}}{85\frac{1}{8}}$	$\frac{19\frac{3}{4}}{36\frac{1}{2}}$	86 6

Nothing definite can be gathered from the above figures at present.

(*b*) *Variety.*—The following table gives the figures from 1911 to 1915 for the variety experiment.

Variety.	Outturn per acre.									
	1911-12.		1912-13.		1913-14.		1914-15.		1915-16.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.
Touli (Hill-rice) ...	14 16	44 28	14 35	26 0	10 20	32 0	14 20	34 0	18 28	25 30
Dhanasi	15 8	35 28	11 39	27 12	13 20	34 0	...	...	16 32	34 0
Krishnabhog	15 4	60 36	8 0	50 32	...	...	...	...	...	...
Mansaura	11 32	39 24	13 25	22 16	13 20	38 0	10 20	24 0	18 12	33 16
Ratomarsi	17 0	39 8	13 6	20 32	9 10	26 0	10 20	24 0	15 4	24 12
Ramtulshi	19 8	53 20	7 16	35 28	8 30	40 0	8 0	28 0	19 0	37 12
Timurah	...	...	...	...	11 30	37 20	5 20	36 0	18 24	33 12

Attention may be drawn to the figures for 1915-16, which shows a considerable increase in outturn from those previous years in spite of the unfavourable season. This was due solely to the careful watch kept on the jhoras (irrigation channels). Ramtulshi—a fine variety of paddy—has, so far, given the highest yield on these small plots, but the Touli variety has year after year shown marked consistency.

(*c*) *Manurial experiments.*—During the past six years an experiment has been conducted to note the effect of green manuring as compared with farm yard manure and an unmanured plot.

The results of the last two years are here recorded:—

Manure.	Outturn per acre.			
	1914-15		1915-16.	
	Grain.	Straw.	Grain	Straw.
	Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.
1. Unmanured ...	16 15	39 0	15 15	23 10
2. 50 maunds cowdung	10 35	24 30	13 20	20 16
3. Green manure Soy-beans (bhatmas).	13 5	36 0	11 31	19 11

From these figures there does not appear to be any advantage from manuring.

Details of operations of a rice area as undertaken on the farm, produced from the cultivation book, are appended :—

Area—2·57 acres.

Variety—Touli—Unmanured.

Date.	Particulars.	Cost.
1915.		Rs. A.
2nd May ...	Ploughing seed-bed	1 0
10th „ ...	Cutting alis seed-bed	0 10
2nd June ...	Preparing seed beds and sowing seeds	9 0
2nd „ ...	Cost of 2 maunds 30 seers seeds ...	
15th to 17th May ...	Ploughing area	8 0
18th to 20th „ ...	Cutting alis	8 0
16th to 20th July ...	Second ploughing	5 8
16th to 20th „ ...	Building alis	6 0
18th to 21st „ ...	Levelling with dandy ...	4 0
18th to 21st „ ...	Ditto hands ...	4 12
18th to 21st „ ...	Transplanting	9 4
18th to 22nd September ...	Weeding	14 8
June to November ...	Irrigation and chowkidari ...	9 0
13th to 15th November...	Harvesting and carrying ...	9 8
22nd and 23rd „ ...	Thrashing and winnowing ...	12 8
	Total cost of 2·57 acres ...	101 10
	Value of yield ...	207 14
	Profit ...	106 4

Paddy was sold at Rs. 3 per maund and straw at annas 9 per maund.

B. (3)—Eleusine—Coracana—Millet—Marwa—Kodo.—This crop grows in rotation with maize and is transplanted from the third week of June to the end of July, so that when the maize crop is harvested in August the Kedo covers the land, having well developed in the interval.

The following table shows the average outturn per acre from 1909 to 1915 from 4·50 acres of land under Marwa :—

	Mds.
1909	26
1910	19¼
1911	22¼
1912	23½
1913	27½
1914	23
1915	23¼

During the year an experiment was tried to test the strength of yield between two varieties, the curly closed and the open loose varieties of Marwa, and the following is the result obtained :—

Variety.	Area.	Outturn.	Cost of cultivation.	Value of crop.
	Acre.	Mds.	Rs. A.	Rs. A.
Curly closed straw* ..	1	21½	43 8	80 4
Open loose straw* ...	1	23¼	47 0	86 6

* Sold at Rs. 5 per acre for grazing.

This experiment will be continued for a few years longer before any conclusions are drawn.

The details of cultivation and cost per acre are as follows :—

Kodo—1 acre.

	Particulars.	Rs. A.	Rs. A.
Seed-bed—			
10th February ...	Ploughing	0 5	
10th „ ...	Breaking clods	0 3	
20th May ...	Manure	2 8	
20th „ ...	Ploughing	0 5	
20th „ ...	Breaking clods	0 3	
20th „ ...	12 seers seeds	1 4	
20th „ ...	Weeding seed-beds	0 4	
		———	5 0
In maize crop—			
20th to 22nd July ...	Weeding	1 0	
20th to 22nd „ ...	Hoeing and transplanting ...	16 4	
10th September ...	Cutting and carrying maize stalks	1 8	
12th and 13th September.	Weeding area	8 0	
1st and 2nd December	Harvesting and carrying ...	8 12	
14th and 15th „	Thrashing and winnowing ...	5 4	
		———	40 12
	Total cost of 1 acre		45 12
	Yield—Grain, 23 maunds at Rs. 3-8 per mannd ...	80 8	
	Straw estimated per acre ...	5 0	
		———	85 8
	Profit		39 12

(4) *Faopyrum—Esculentum—buckwheat—t'haphar*—This crop is grown in rotation after maize. Seed is sown in September and is ready for harvesting at the end of November or beginning of December.

A variety test is being continued since 1911 with Japanese and local buckwheat with the following results :—

	Variety.	Area.	Yield per acre.	
			Grain.	Straw.
		Acres.	Mds. s.	Mds. s.
1911	Japanese buckwheat	·5	1 30	2 16
	Local buckwheat	·5	12 24	50 10
1912	Japanese buckwheat	·5	9 0	12 26
	Local buckwheat	·5	9 24	27 0
1913	Japanese buckwheat	·5	9 15	10 10
	Local buckwheat	·5	12 0	55 0
1914	Japanese buckwheat	·5	3 36	8 10
	Local buckwheat	·5	4 20	17 5
1915	Japanese buckwheat	1·0	2 8	10 15
	Local buckwheat	1·0	1 34	22 30

From these figures there is apparently no good reason for changing the local variety, the more so, as no cultivator is anxious to try the foreign seed.

In the past two years this crop has suffered severely from drought, and it has been thought advisable to discontinue the cultivation of the Japanese variety.

The following table gives details of the cost of this crop :—

Buckwheat—1 acre after maize.

			Rs.	A.	P.
16th September	...	Cutting and carrying maize stalks ...	1	12	0
17th „	...	Ploughing	4	0	0
19th „	...	Breaking clods and sowing seeds ...	2	0	0
19th „	...	1 maund seeds	2	10	0
20th November	...	Harvesting, thrashing, etc. ...	1	12	0
		Total ...	12	2	0
		Value of yield ...	5	12	3
		Loss ...	6	5	9

Wheat.—Four varieties of Australian drought-resisting wheat as well as Pusa No. 6 were tried on this farm during the year under report, but for want of rain the seed even did not get a proper chance of germinating. This corroborates previous experience, which shows this crop to be unsuitable for the locality.

5. *Unirrigated rice (aus dhan or ghaiya).*—This crop is usually sown broadcast on slopes thoroughly exposed to wind and air and well drained. On the farm it is sown in rows at 18 inches and seeds dibbled in at 8 inches apart.

In 1914-15 on a ·75 acre plot an outturn of 15 maunds 6 seers of grain *plus* 98 maunds of straw was obtained at an expenditure of Rs. 29-9. This year, 1915-16, from an acre plot an outturn of 24 maunds 15 seers of grain *plus* 137 maunds of straw was obtained, the grain and straw being sold at Rs 3 and annas 2 per maund, respectively, yielding a return of Rs. 90-4, while the cultivation cost being Rs. 46-4, giving a clear profit of Rs. 44.

Leguminous crops.—The following crops belonging to this order are grown in this district and on this farm :—

Botanical name.	English name.	Nepali name.	Number of varieties.	Remarks.
Glysine Lispida ...	Soybean ...	Bhatmas ...	6	Lepcha name, "Silliyan."
Phaseolus mungo ...	Dal ...	Dal-Kalai ...	2	
Dolichos biflorus ...	...	Gahat ...	2	

Soybean.—The following varieties were grown on the farm :—

Variety.	Area.	Outturn per acre.								Remarks.
		1912-13.		1913-14.		1914-15.		1915-16.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
		Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	
Nepali Bhatmas ...	·75	14	10	16½	14	20½	23	10	17	Whole season crop.
Barmali	·75	5	7	13	20	8½	15	5	8½	
Green	·75	4½	6	13	20	8⅞	14½	2	13	
Chocolate ...	·75	9½	16	14½	19½	9¾	17½	7¾	11½	Grown in rotation with maize.
Black	·75	6¼	13	11¼	17¼	8¼	19	5⅜	9¼	

The first two varieties in addition to the white, which is not grown on this farm, belong to the erect-growing varieties, while last three mentioned are of trailing habits.

All these leguminous crops can be grown in rotation with maize. However, Nepali soybeans produce very little when grown along with the maize, but when grown alone they yield heavily. They cannot, however, compete with maize. The cost of cultivation of these crops is Rs. 23 per acre except the Nepali variety which, when grown alone in the open, costs

Rs. 43 per acre. The value of Nepali soybeans is Rs. 5 a maund and of the other varieties Rs. 3-12.

B.—(*7*) 1. *Jute—Corchorus capsularis.*—This crop was grown for three years, an outturn of 2½ maunds per acre being the best return obtained. It was abandoned as being uneconomical.

2. *Sugarcane—Saccharum officinarum.*—This crop takes 18 months to come to maturity on this hillside, as compared with 10 months on the plains.

This year from an area of ·53 acre an outturn of 24 maunds of gur was obtained and sold at Rs. 10 per maund. Last year an outturn of 17 maunds of gur was obtained. It is apparently more profitable to cultivate this crop on a large scale for gur-making instead of for chewing purposes as is the custom amongst the hill people. There is a very great demand for gur even at the high price quoted. The cultivation expenses for this crop this year was Rs. 55-10, giving a clear profit of Rs. 184-6 (for 53 acres).

3. *Kalai—Phascolus—mungo—Dal.*—Three acres were placed under this crop and an outturn of 13 maunds 2 seers of grain was obtained, that is, an average of 4½ maunds per acre. An unusual drought at the most critical time was again experienced this year.

4. *Gahat—Dolichos biflorus.*—An area of 1 acre was cultivated under this crop and an outturn of 11 maunds 30 seers of grain was obtained. The figures, though a little less than those of last year, are quite satisfactory, but it has been found that this crop does much better in poor red gritty soils than in rich loamy soils. This crop is just what is needed for waste lands that will not grow marwa, soybeans and dal economically.

5. *Potatoes.*—Another attempt was made this year to grow Italian and Sikkim potatoes on $\frac{1}{12}$th acre plots each, but the results obtained were very unsatisfactory, due to want of irrigation, there being no source of water other than the usual winter showers, which this year again practically failed.

Groundnuts.—An attempt was made to cultivate this crop on the farm, and three varieties—Virginian, Big Japanese and Mauritius—were obtained from the Madras Agricultural Department and tried on $\frac{1}{12}$th acre plots each. The crops grew luxuriantly and good results were expected, but when harvested, three-fourths of the crop had absolutely nothing inside the shell. Outturns of 6, 12 and 6 maunds, respectively, of good seed were obtained per acre and sold at Rs. 7 per maund. Cultivation expenses being very high and constant, earthing not proving satisfactory on the hillside, we have decided to discontinue this crop.

6. *Fruit culture.*—One hundred and fifty-eight fruit trees were ordered from Messrs. Bunyard & Co., Maidstone, Kent, England, and received in December 1907. The trees were first grown under shade until conditions were favourable for outdoor planting. The larger varieties were planted in June 1908 and the remainder in 1909.

Since planting, these trees have gradually died down or rotted, there being now only three trees left fighting hard for existence, although every attention and care has been given to them. Owing to the high rainfall, the absence of frost and the comparatively low elevation (3,600 feet), it has been decided to give a trial to plants from Australia instead of continuing with English varieties.

Nine Australian Naval orange trees were planted on 18th May 1911 and give promises of doing well.

A few Japanese fruit trees were received from Mr. Proudlock of Dacca in October, and have since been kept in a bed ready for planting out as soon as the rains have well set in.

Pineapples.—Suckers of the "Queen" pine were obtained from the Kalimpong Government Fruit nurseries in August 1908 and planted on ·15 acre. Since then planting has been extended all over the fruit area. The following results have been obtained from ½ an acre. The suckers were planted out in September 1912-13 :—

	Cultivation expenses.	Outturn in pines.	Value.
	Rs. A.	As. P.	Rs. A.
1912-13 and 1913-14 ...	102 10	54 at 2 6 each	8 7
1914-15	27 4	497 „ 2 0 „	62 2
1915-16	31 0	1,002 „ 2 0 „	125 4
Total ...	160 14	1,553	195 13

After deducting all expenses a profit of Rs. 34-15 is shown in three years. The sum of Rs. 82, which was included in the cost of cultivation for 1912-13 was charged for 1,312 suckers at 1 anna each. These were not paid for by the farm, but they were taken from the Government gardens. This brings up the profit to Rs. 116-15, and yearly for another 4 or 5 years large returns are expected with little expenditure. This Queen variety is much sought after by the villagers, and a large number of suckers have been again distributed this year.

Bananas, limes, papyas, peaches, oranges and guavas are also cultivated largely. From an area of 2½ acres under various fruit trees the sum of Rs. 456-4 was realised. This includes the amount received from the sale of pineapples.

Heavy root pruning was carried out with six of our oldest peach trees in the month of November 1915, with the result that the trees were in full bloom about a fortnight earlier this year. As a consequence for the first time on record we have gathered fully ripe peaches from these trees. This method of improvement will be gradually extended to all fruit trees on this farm.

7. *Vegetable cultivation.*—This work has just been taken in hand. The area has been laid out, pipes have been laid, and vats for the necessary irrigation have been erected.

7. *Receipts and Expenditure.*—A copy of the Balance Sheet for the year ending 31st March 1916 is given below :—

Receipts.	Rs.	A.	P.
Balance from 1914-15 ...	1,786	5	5
Government grant ...	5,000	0	0
Farm produce ...	4,782	13	6
Miscellaneous receipts ...	200	11	0
Bullocks ...	206	0	0
Total ...	11,975	13	11

Expenditure.			Rs.	A.	P.
Labour ...	2,411	13 0			
Superintendence	2,617	12 5			
			5,029	9	5
Miscellaneous, seeds, manures, repairs, postage, etc.			831	3	6
Bullocks ...			368	0	0
Capital outlay ...			3,232	11	3
Implements ...			89	11	0
½ crop to Homes ...			2,391	6	9
Insurance policy of renewal ...			30	4	0
Balance in hand ...			3	0	0
Total ...			11,975	13	11

The value of total produce sold shows an increase of Rs. 711-9-3 over that of 1914-15, while the wages bill for monthly and daily labour shows an increase of Rs. 515-13-3 due to the increase of area under khas cultivation. In addition, the clearing of the new property taken over by the farm, the extra work on the silo, the laying out of the vegetable garden, etc., has entailed heavy expenditure.

Capital expenditure.—A pucca thrashing floor 94′ × 88′ built at a cost of Rs. 1,329 has proved a convenience and will effect a saving. A property in the very heart of the farm comprising of 7·05 acres of land under orchard, etc., with a bungalow in which the Manager is living, was purchased during the year for Rs. 10,759 *plus* an outlaying portion of 1·14 acres from the farm area (in part payment). A contribution of Rs. 2,375 was made towards this purchase from the farm balance for 1915-16.

8. *Acknowledgment and training.*—We are again indebted to Mr. H. F. Green of Munsong for his kindness in valuing the farm stock. This as at 31st March 1916 was valued at Rs. 2,134 as compared with 31st March 1915 Rs. 2,230.

An epidemic of rinderpest broke out in the district in the beginning of 1916 and six farm bullocks died.

During the year under report no boys from the St. Andrew's Colonial Homes received training on this farm, but Dr. Sutherland with his senior boys and masters of the Normal School visited the farm on various occasions for lectures and practical demonstration. The Hon'ble Miss Mary Scott of the girls' school also brought her girls down for lectures and demonstrations. Owing to the efforts of officials and various interested people our improvements have been brought to the notice of cultivators. The Manager of the Khas Mahals has been instructed to bring the Government khas mahal raiyats as well as members of the co-operative credit societies down to this farm for instruction. He has visited this farm with a large number of raiyats from various blocks, for lectures and practical demonstration in gur-making

and for the final maize seed selection before sowing. After the instructions on gur-making a large number of raiyats purchased 4½ maunds of gur on the spot, while during the maize seed selection many orders were executed. Later the request for maize seed became so great that we could not supply the demand. Now that the raiyats know where they can procure seeds and for whom the farm is chiefly intended, we can look forward to greater popularity.

9. *Seeds supplied.*—The following seeds, etc., were distributed during the year 1915-16 :—

	Mds.	srs.	lbs.
Maize	37	0	3,034
Paddy	6	20	533
Soybeans	6	5	502
Buckwheat	2	2½	169
Dal	0	15	30
			Number.
Orange goetias			232
Locquots „			11
Limes „			27
Bananas or plantain shoots			97
Pineapples, suckers			340
Sugarcane cuttings			115

There have been many requests for orange trees, and as there are no trees on the Government gardens, I have been obliged to supply them from this farm free of cost, as well as other varieties of fruit trees, etc.

10. *Management.*—The land for the farm was bought by the St. Andrew's Colonial Homes, and is subject to an annual rental of Rs. 70-1.

The farm is managed by the St. Andrew's Colonial Homes, and the Bengal Government grant of Rs. 5,000 *plus* half-sale proceeds is sufficient to pay for the upkeep of the farm. The remaining half of the sale-proceeds is credited to the Homes. Mr. H. R. Edmunds has been in charge during the year.

The progress of work for this farm is drawn up in consultation with the Agricultural Department, Bengal.

His Excellency the Governor of Bengal, Mr. J. T. Rankin, Deputy Commissioner of Darjeeling, Mr. Wilson of Cawnpore, Agricultural Department, visited the farm.

Mr. F. Smith, Deputy Director of Agriculture, Bengal, inspected the farm in November 1915, April and June 1916.

F. SMITH,

Deputy Director of Agriculture.

APPENDIX.

District Demonstration work.

I have given the district staff under my control. Definite results obtained during the past year are given below in tabulated form :—

1.	Groundnuts—	...	...	Bankura district.
2.	Ditto	...	...	Birbhum „
3.	*Aus* paddy	Castor-cake manuring	...	Presidency Division.
4.	*Amun* „	Dhaincha green „	...	„ „
5.	„ „	Bonemeal „	...	„ „
6.	„ „	Dhaincha green „	...	Birbhum district.
7.	„ „	Bonemeal „	...	„ „
8.	*Jute*	Castor-cake „	...	Presidency Division.
9.	„	Nitrate of soda „	...	„ „

GROUNDNUTS.

Groundnuts (China badam) (Arachis hypogœa) as a valuable crop for Bankura.

The following results have been obtained in 1915 by the Bengal Agricultural Department under the personal supervision of Mr. J. N. Sircar, Superintendent of Agriculture, Burdwan Division, controlled by the Deputy Director:—

BANKURA.

Serial No.		Area.		Yield per bigha.	Value per maund.	Value per bigha.
		Bighas.		Mds.	Rs.	Rs.
1	Taldangra, J. N. Bhui ...	2	Seed rate—10 seers per bigha. Seed time—May, June first rains. Harvest—November, December.	8⅓	6	50
2	Patpur, J. Nandy ...	1		12	6	72
3	Rajarambad, R. R. Mitter ...	3		4½	6	27
4	Bankura, Rev. Mr. Mitchell ...	1		(a)	(a)	(a)
5	Kalikapur, R. N. Banerjee ...	1		5	6	30

(a) Grown on very rocky land.

GROUNDNUTS.

Groundnuts (China badam) (Arachis hypogœa) as a valuable crop from Birbhum.

The following results have been obtained in 1915 by the Bengal Agricultural Department under the personal supervision of Mr. J. N. Sircar, Superintendent of Agriculture, Burdwan Division, controlled by the Deputy Director:—

BIRBHUM.

Serial No.		Area.		Yield per bigha.		Value per maund.	Value per bigha.
		Bighas.		Mds.		Rs.	Rs.
1	Shahpur (Chinpai), Munshi Ellahadad.	3	Seed rate—10 seers per bigha.	7	High sandy soil.	6	42
2	Hetampur, S. N. Chakravarty.	½	Seed time—May, June, July first rains.	6	Ditto ...	6	36
3	Bolpur (Santiniketan), S Mazumdar.	¾	Harvest—November, December.	6⅔	Ditto ...	6	40

AUS PADDY.

Castor-cake Manuring.

Results obtained in Presidency Division in 1915 by District Agricultural Officer S. K. Dutt and Superintendent of Agriculture Mr. H. P. Mittra, controlled by Deputy Director:—

Manure.	Outturn per bigha.											
	1	2	3	4	5	6	7	8	9	10	11	12
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Castor-cake, 1 maund per bigha ...	13	6	9½	9	9¾	10	9½	9	6	6	4	4
Local manuring, *i.e.*, 20 maunds cowdung	...	4	8	...	...	...	...	...	...	...	...	...
Without manure	7¾	...	7¼	5¼	5½	5	6¼	7½	4	2¼	3	1½
Increase due to castor-cake	5¼	2	2¼	3¾	4¼	5	3¼	1½	2	3¾	1	2½

Cost of Castor-cake per bigha—Rs. 2-8.

1. Carried out by S. N. Ghosh and K. Mondol at Goshpur, 24-Parganas, on 1 bigha.
2. Ditto J. N. Bose at Jamalpur, Baraset, 24-Parganas, on 1 bigha.
3. Ditto S. Mondol at ditto ditto ditto ditto.
4. Ditto M. Mondol at Chandpur, ditto ditto ditto.
5. Ditto S. N. Bose at Jamalpur, ditto ditto ditto.
6. Ditto R. Mondol ditto ditto ditto ditto.
7. Ditto H. Mondol at Sekendanagar, Baraset, 24-Parganas, on 1 bigha.
8. Ditto J. L. Bose at Damurhoda, Nadia, on 1 bigha.
9. Ditto R. Roy at Hardi, Alamdanga, Nadia, on 1 bigha.
10. Ditto Kismat Sheikh at Hardi, Alamdanga, Nadia. on 1 bigha.
11. Ditto J. De Menvielle, Ramnugger, Plassey, Nadia, on 1 bigha.
12. Ditto S. N. Ghosh at Rajibpur Dogachia, Baraset, 24-Parganas, on 1 bigha.

AMAN PADDY.

Dhaincha Green Manuring.

Results obtained in 1915 in the Presidency Division by District Agricultural Officer S. K. Dutt, and Superintendent of Agriculture, Mr. H. P. Mittra, controlled by the Deputy Director :—

Manure per bigha.	Outturn per bigha.							
	1	2	3	4	5	6	7	8
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Dhaincha green manure ...	7¼	8	8	7½	7½	6	9½	4¾
Nil	6¼	5	6	6½	6½	5	8½	2¾
Increase due to Dhaincha...	1	3	2	1	1	1	1	2

Cost of Dhaincha seed per bigha—4 annas.

1. Carried out by S. N. Ghosh at Rajibpur, Dogachia, 24-Parganas, on 1 bigha.
2. Ditto T. D. Banerjee at Ghoshpur, Maslandpur, 24-Parganas, on 1 bigha.
3. Ditto H. Mondal at Sekendanagar, 24-Parganas, on 1 bigha.
4. Ditto S. Mondal at Jamalpur, Baraset, 24-Parganas, on 1 bigha.
5. Ditto H. Mondal at Gealpukur, 24-Parganas, on 1 bigha.
6. Ditto A. Safui at Sekendanagar, 24-Parganas, on 1 bigha
7. Ditto L. Safui at Nangi, 24-Parganas, on 1 bigha.
8. Ditto A. J. Das at Protaphurkuthir, Gobardanga, 24-Parganas, on 1 bigha.

Bonemeal Manuring.

Results obtained in 1915 in the Presidency Division by the District Agricultural Officer S. K. Dutt, and the Superintendent of Agriculture Mr. H. P. Mittra, controlled by the Deputy Director :—

Manures per bigha.	Outturn per bigha.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
Bonemeal, 1 md.	8½	9½	10½	9½	12½	8	9	8¾	6	8	4½	9	11	10½	10	8½	9	8½	10	12
Nil	6¾	6	6½	5	8½	7	8	7½	4½	6¾	2¾	7	10	9½	7½	7	7½	7½	6	9
Increase due to Bonemeal ...	2	3½	3¾	4½	4	1	1	1¾	1½	1¼	1¾	2	1	1	2½	1½	1½	1	4	3

Cost of Bonemeal per bigha—Rs. 2-8.

1. Carried out by S. N. Ghosh at Rajibpur, Dogachia, Baraset, 24-Parganas, on 1 bigha.
2. Ditto S. Mondal at Jamalpur, Baraset, 24-Parganas, on 1 bigha.
3. Ditto H. Mondal at Goalpukur, ditto ditto on 1 ,,
4. Ditto A. Safui at Sekendanagar, ditto on 1 ,,
5. Ditto M. L. Safui, at Nangi, Alipur, ditto on 1 ,,
6. Ditto G. C. Behra at Nangi, Alipur, ditto on 1 ,,
7. Ditto K. P. Maitra at Malancha, Alipur, ditto on 1 ,,
8. Ditto T. C. Naskar at Kharibaria, Budge-Budge, 24-Parganas, on 1 bigha.
9. Ditto B. Naskar at Champahati, ditto ditto on 1 ,,
10. Ditto A. L. Dobey at Jalsaka, ditto ditto on 1 ,,
11. Ditto A. C. Das at Protaphurkuthir, ditto ditto on 1 ,,
12. Ditto J. Saha at Ghoperghat, Jessore, on 1 bigha.
13. Ditto K. Rahaman at Payagram Kasha, Khulna, on 1 bigha.
14. Ditto K. Ahmed at Daulatpur, Khulna, on 1 bigha.
15. Ditto P. C. Biswas at Matikumra, Ranaghat, Nadia, on 1 bigha.
16. Ditto K. C. Mukherjee at Debagram, Nadia, on 1 bigha.
17. Ditto B. N. Mullick at Ranaghat, Nadia.
18. Ditto S. B. Roy at Jorur, Murshidabad, on 1 bigha.
19. Ditto N. N. Chatterjee at Kumarsanda, Murshidabad, on 1 bigha.
20. Ditto S. K. Chatterjee at Madapur ditto on 1 ,,

Dhaincha Green Manure.

Results in Birbhum in 1915.

Work carried out by Mr. J. N. Sircar, Superintendent of Agriculture Burdwan Division, controlled by Deputy Director of Agriculture, Bengal:—

BIRBHUM.

Manure per bigha.	Outturn per bigha.				
	A.	B.	C.	D.	E.
	Mds.	Mds.	Mds.	Mds.	
Dhaincha green manure ...	10	7	5½	6½	
Local manuring, *i.e.*, 50 maunds cowdung.	7	5	3½	3	Failed owing to drought.
Increase due to Dhaincha ...	3	2	2	3½	

Cost of Dhaincha Seed per bigha—4 annas.

A. Carried out at Basudebpur by K. D. Ghose on 4 bighas.
B. Ditto ditto by L. Sheikh on 3 ,,
C. Ditto Gocchepara by Shitab Sheikh on 1 bigha.
D. Ditto Rampurhat by Munshi Baherjan on 1 ,,
E. Ditto Shahpur by ,, Ellahadad on 30 bighas.

AMAN PADDY.

Bonemeal Manuring.

Results in Birbhum in 1915.

Work done by Mr. J. N. Sircar, Superindendent of Agriculture, Burdwan Division, controlled by Deputy Director of Agriculture, Bengal :—

BIRBHUM.

	Outturn per bigha.								
	A.	B.	C.	D.	E.	F.	G.	H.	I.
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	
Bonemeal, 1 md. per bigha	13	8	6	7	8	5½	6	8¼	Failed owing to drought.
Local manuring, *i.e.*, 50 mds. cowdung.	8¾	5	5	4	6	3	4½	6	
Increase per bigha due to bonemeal.	4¼	3	1	3	2	2½	1½	2¼	

Price of Bonemeal, per bigha—Rs. 2-8.

A. Carried out at Indragacha by A. Ganguli on 4 bighas.
B. Ditto Gocchepara by Osman Sheikh on 2 bighas.
C. Ditto Ditto by Amarat Sheikh on 4 bighas.
D. Ditto Ditto by Shitab Sheikh on 2 bighas.
E. Ditto Ditto by Sheikh Akbar on 4 bighas.
F. Ditto Nalhati by Dr. K. D. Sircar on 9 bighas.
G. Ditto Rampurhat by Munshi Abdulla on 4 bighas.
H. Ditto Sekedda by Khan Bahadur Shams-uz-zuha on 120 bighas at ½ md. per bigha.
I Ditto Sadya by Sagar Mean on 82 bighas.

JUTE.

Castor-cake Manuring.

Results obtained in 1915 in the Presidency Division by District Agricultural Officer S. K. Dutt, and Superintendent of Agriculture Mr. H P. Mittra, controlled by Deputy Director :—

Manures per bigha.	Outturn per bigha.										
	1	2	3	4	5	6	7	8	9	10	11
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds	Mds.	Mds	Mds.	Mds.	Mds.
Castor-cake, 2 mds. ...	8½	6	6½	7½	7¾	8	4½	4½	4	7	7
Local manuring (20—30 mds. cowdung).	5¾	4½	...	...	...	6½	...	...	...	...	...
Nil	...	...	3½	4	4	5	3	3	3	5	5
Increase due to castor-cake.	2¾	1½	3	3½	3¾	1½	1½	1½	1	2	2

Cost of Castor-cake per bigha—Rs. 5.

1. Carried out by S. N. Ghosh at Rajibpur, Dogachi, 24-Parganas, on 1 bigha.
2. Ditto P. Mandal at Ghoshpur ditto ditto.
3. Ditto I. Mondol at Jamalpur, Baraset ditto.
4. Ditto H. Mondol at Golakpur ditto ditto.
5. Ditto K. Biswas at Abjanagar, 24-Parganas, on 1 bigha.
6. Ditto M. Mondol at Chandpur ditto.
7. Ditto H. K. Sanyal at Kotchandpur, Jessore, on 1 bigha.
8. Ditto E. G. McLeod ditto ditto.
9. Ditto J. L. Bose at Damurhuda, Nadia, on 1 bigha.
10. Ditto R. Roy at Hardi, Alamdanga, Nadia, on 1 bigha.
11. Ditto K. Sheikh at Hardi, Alamdanga, Nadia, on do.

JUTE.

Nitrate of Soda Manuring.

The following results were obtained in 1915 by the Bengal Agricultural Department under the personal supervision of District Agricultural Officer S. K. Dutt, and Superintendent of Agriculture Mr. H. P. Mittra, controlled by the Deputy Director:—

Plots.	Manure per bigha.	Outturn per bigha.			
		1	2	3	4
		Mds.	Mds.	Mds.	Mds.
1	Local manuring	3½	4	4	5½
2	Nitrate of soda ... ... 27 lbs.	6¾	7¾	7¾	7½
	Basic superphosphate ... ... 27 „				
	Increase due to nitrate of soda and superphosphate ...	3¼	3¾	3¾	2
		Rs.	Rs. A.	Rs.	Rs.
	Value of increased outturn per bigha	26	30 0	30	16
	COST OF MANURE PER BIGHA.				
	Nitrate of soda at Rs. 9 per md.	...	3 0		
	Basic superphosphate at Rs. 2-9 per md. ...	...	0 14		
			Say, 4 0		
	Increased net profit per bigha due to nitrate of soda	22	26 0	26	12

1, 2 and 3. J. N. Bose at Jamalpur, Baraset, 24-Parganas.
4. S. N. Ghose, at Rajibpur, Dogachia, 24-Parganas.

For details of quantities of seeds, manures and implements distributed from each divisional seedstore and receipts and expenditure incurred during the year under review, the respective reports of the Superintendents of Agriculture should be consulted.

The *Burdwan Divisional Seedstore* distributed in 1915-16, 18 maunds groundnuts and 35½ maunds of dhaincha seed.

For the 1916 crop, 77,000 cane cuttings.

In 1915, 400 maunds of dhaincha seed were sent to Madras while in 1916, 450 maunds were sent.

In 1915, 445 maunds of bonemeal were distributed at half cost price, while in 1916, 402½ maunds have been distributed at the full rate—

seed 232 Maunds castor-cake.
33 do. nitrate of Soda.
21 do. paddy.
3 Chain pumps.
1 Don (water-lift)

The Presidency Divisional Seedstore distributed in 1915-16—

7 Maunds dhaincha seed.
71 Maunds groundnut seed.
169 Do. bonemeal.
161 Do. castorcake.
10¼ Do. superphosphate.
41¾ Do. nitrate of soda.
½ Maund of sulphate of ammonia, a few dons and a little chiefly for demonstration purposes.

F. SMITH,

Deputy Director of Agriculture, West Bengal.

The 24th July 1916.

ANNUAL REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, EASTERN BENGAL, FOR THE YEAR ENDING 30th JUNE 1916.

I BEG herewith to submit the Annual Reports for the Eastern Circle. The year under report has been one of continued progress, and I beg to draw your attention to several items which are of great importance.

(1) *The value of Economic Botanist's improved paddy, Dacca, No. 1.*—From the farm reports it will be seen that this variety has given on an average a higher outturn by 240 pounds per acre than the next best varieties compared with it. In these tests it competed with selected varieties from all over Bengal.

Comparative tests were made on raiyats' fields in the districts of Dacca and Mymensingh. The average yield per acre in the Dacca district was 600 pounds better than that of the cultivators' varieties, whilst in the Mymensingh district the difference amounted to 320 pounds per acre.

In the paper on the improvement of the rice crop read at the Provincial Agricultural Conference in Calcutta on the 4th and 5th July 1916, the fact was pointed out that if Dacca No. 1 paddy replaced the other varieties grown throughout Bengal, an increased revenue of 22½ crores of rupees, or £15,000,000 per annum, would accrue to the cultivators. These figures show the enormous importance of this line of work.

(2) *The comparative trials of Mr. Finlow's selected jute seed Kakya Bombai, No. 7.*—At the Inter-Provincial Conference on jute held in Calcutta from 2nd to 4th August 1915, the question was brought up of the difficulties in obtaining reliable figures from Demonstrators in the districts, the chief trouble being that the crops compared were not weeded and thinned at the same time.

To obviate this difficulty, Messrs. Sinclair Murray & Co., and Messrs. Landale Clarke & Co., came forward with an offer to make comparative trials on land at their mufassal agencies. Results are not yet to hand, but the appearance of the growing crop in nearly every case indicates the superiority of Kakya Bombai No 7. These trials have been conducted on 27 different plots throughout Eastern Bengal. I have to thank Mr. Suttie and Mr. Kinmond Luke for all the trouble they have taken; and the managers at all the agencies have been particularly anxious to help the department in every way. They have personally supervised the cultivation, manuring, weeding and thinning of the plots.

(3) *Value of bonemeal and lime.*—In my last year's report I pointed out the striking effects of applications of bonemeal and lime throughout the red laterite tract and the enormous economic possibilities thereof.

The demonstration of this treatment has been extended. In the vicinity of the Dacca Farm the application of lime and bonemeal is now regularly practised by the raiyats.

(4) *Introduction of potato cultivation.*—3,655 maunds 25 seers of potatoes were sold during the year. In certain areas where the crop is now established the function of the Department has ceased, and it is hoped that it will be possible to make arrangements to put the raiyats in touch with seed agencies.

In this connection I had a meeting with Mr. Rankin, the Deputy Commissioner, and Mr. Mitra, the Registrar of Co-operative Societies, in Darjeeling, and discussed with them the possibility of starting co-operative seed-growing societies in the Darjeeling district. As a result one society has been started, and if this proves a success others will doubtless be initiated.

If the co-operative societies on the plains could deal directly with similar societies in the Hills which supplied seed-potatoes, it would be mutually advantageous.

Tours.—I was out on tour for 190 days and visited the following places during the year:—

Narayanganj, Munshiganj, Kaoraid, Kurmitolla, Boiderbazar, Bhairab, Mirpur, Mymensingh, Mantolla, Balaspur, Singjani, Jamalpur, Sutiakhali, Gafargaon, Sarishabari, Nikli, Jagannathganj, Bhola. Barisal, Kasipur, Madaripur, Charmuguria, Ghatmaji, Chittagong, Jaleykarmarghat, Chiringia, Cox's Bazar, Ramu, Moheshkhali, Kutubdia, Comilla, Rajendrapur, Chattalpara, Ashuganj, Daulatkandighat, Akhaura, Rajshahi, Dighapatia, Nallair, Motgram, Augpara, Dhurail, Eshabpur, Phoodkipara, Maduahati, Rangpur,

Kakina, Tushbhander, Saidpur, Daroani, Burirhat, Jalpaiguri, Rajabhatkhawa, Garopara, Nimali, Domanpur, Raimating, Mendabari, Nilpara, Gagaon, Totopara, Madarihat, Bannarhat, Kuntamari, Goalpara, Darjeeling, Kurseong, Rajbari, Senchal, Serajganj, Calcutta, Chinsurah, Burdwan, Ondal, Haripal. Paneshola, Bankura, Makarkul, Isapur and Pusa.

Seed stores.—During the year 700 maunds of paddy seed of the Economic Botanist's selected variety, Dacca No. 1, was distributed to raiyats on the condition that an equal quantity would be returned at harvest time, and that the Department could, if it so desired, buy up the whole crop.

This means that, taking a low average outturn of 20 maunds per acre, nearly 50,000 maunds of Dacca No. 1 paddy will be produced.

I estimate that at least 5,000 maunds will be required for distribution in the coming season, and arrangements will have to be made for storage. Buildings are available at the Dacca Farm, but certain alterations will have to be carried out.

In conclusion I beg to note that the storage and distribution of both Mr. Hector's paddy and Mr. Finlow's jute are the two chief problems which have to be faced in my circle, and that increased grants will be necessary to finance these operations. Any such grants, however, would be in the nature of a loan to the Department as the expenditure incurred would of course be recouped through sales.

KENNETH MCLEAN,
Depy. Director of Agriculture, Eastern Bengal.

ANNUAL REPORT OF THE DACCA CENTRAL FARM FOR 1915-16.

THE two most important crops of Eastern Bengal—rice and jute—receive most attention on this farm.

The soil of the farm is typical of a large tract, which includes the Madhupur jungle, and the results obtained in the efforts to improve these crops tend to show that a large extent of land now lying waste could be brought under profitable cultivation.

Excellent crops of sugarcane are produced in years of normal rainfall, and the study of varieties has been continued on the farm. It is now evident that exotic canes deteriorate after a few years' growing, and that fresh importations of seeds are necessary.

Varietal work has been commenced on chillies, rahar and millets, with a view, in the case of the first two crops, to select high yielding varieties, and in the case of the last, to select drought-resisting varieties.

Manurial work on paddy and jute has been continued.

Rainfall.—The rainfall during the kharif season was much above normal, as is shown in the table below:—

Months.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1915.	Inches.		Inches.	
April	5·84	8	4·88	6·7
May	19·24	21	9·6	11·3
June	25·17	25	13·38	15·2
July	12·6	25	12·85	17·5
August	19·37	28	12·53	17·40
September	11·12	14	9·43	11·70
October	4·37	8	Nil	Nil
November	·49	2	Nil	Nil
December	Slight	..	Nil	Nil
1916.				
January	Nil	...	Nil	Nil
February	1·79	1	1·12	1·8
March	Nil	...	2·59	3·5

Work on Paddy or Rice (Oryza sativa).

Aus paddy—Varietal.—Four varieties were tested on an area of 4 acres. The result is tabulated below:—

Serial No.	Name of crop.	Area in acres.	Outturn per acre in lbs.
1.	Surjyamukhi	1	1,765
2.	Larcose	1	1,726
3.	Pukhi	1	1,662
4.	Corfa	1	1,580

Surjyamukhi and Larcose gave the highest yields. The interesting point was the high yield recorded for Pukhi, which is an early ripening variety of great importance in a double paddy rotation, *i.e.*, where transplanted paddy follows aus paddy in the same year.

Single plant selections of this variety will be made this year, selecting particularly for—

(1) Early ripening. | (2) Yield.

Manurial.—The experiment with bonemeal was continued and the result is given below:—

Variety—Larcose.

Serial No.	Manure applied.	Outturn per acre in lbs.
1.	Unmanured	1,360
2.	Cowdung, 50 maunds	1,890
3.	Bonemeal, 3 „	2,105
4.	Cowdung, 50 „ ... ... Bonemeal, 3 „	2,252
5.	Cowdung, 50 „ ... ... Bonemeal, 3 „ ... ... Lime, 5 „	1,922
6.	Cowdung, 50 „ ... ... Lime, 5 „	1,702

The results obtained during the previous season are verified. Curiously enough bonemeal has again given better results when used alone than when combined with lime. The effect of lime on this soil is particularly evident in the case of the jute crop and the rabi crops. Thus, for a rotation, a combined dressing of lime, bonemeal and cowdung is undoubtedly sound.

Seed-testing Experiments.

A comparison was made between seed which sank in a saturated salt solution and untreated seed.

The outturns are given below:—

Variety—Larcose.

Serial No.	Kind of seeds raised.	Outturn per acre in lbs.
1.	Untreated seeds	1,598
2.	Seeds which sank in a saturated salt solution ...	1,756

Drilling paddy seed.—Mr. Hector obtained a drill from Poona, and this was compared with a drill made on the farm.

The working of the Poona Seed Drill depends entirely on the individual who fills the bowl, and as this is really the work of an expert, the sowing was not well done. The farm drill sows mechanically, and an even germination was obtained.

The sowings were late but the following results were obtained, 1 acre being sown with each drill:—

Results.

	lbs.
Poona Seed Drill	820
Farm ditto.	1,568

Aman Paddy—Varietal experiments.—The results tabulated below show the different yields:—

Office Ravine.

Serial No.	Name of crop.		Area in acre.	Outturn per acre in lbs.
1.	Dacca, No. 1 (Indrasail selected)	...	1	2,583
2.	Badshabhog (Dacca selected)	...	1	2,100
3.	Chinigura (ditto)	...	1	2,214
4.	Lalbalam (ditto)	...	1	2,115
5.	Kataribhog (ditto)	...	1	2,031
6.	Lohadung (ditto)	...	1	1,899
7.	Malati (ditto)	...	1	1,869
8.	Lambachikan (ditto)	...	1	1,890
9.	Dadkhani (local variety) ...	...	1	990

Rakhali Byde.

Serial No.	Name of crop.		Area in acre.	Outturn per acre in lbs.
1.	Dacca No. 1, (Indrasail selected)	...	1	2,283
2.	Lambachikan (Dacca selected)	...	1	2,229
3.	Lohadung (ditto)	...	1	1,739
4.	Chinigura (ditto)	...	1	1,399
5.	Malati (ditto)	...	1	1,246
6.	Badshabhog (ditto)	...	1	1,092
7.	Lalbalam (ditto)	...	1	989
8.	Kataribhog (ditto)	...	1	715
9.	Dadkhani (local variety) ...	...	1	633

Dacca No. 1, a selected variety of Mr. Hector's proved to be much the highest yielder. In the Zala Bisra Ravine an outturn of 3,460 lbs. per acre was obtained. In all about 50,000 lbs. of Dacca No. 1 seed was harvested, and the whole of this has been distributed to cultivators.

Manurial experiments.—The low lands are unsuitable for manurial experiments, there being extraordinary difference in the fertility of individual plots. Records of outturns from plot to plot are being kept and compared with the idea of eventually standardising each plot.

Jute (Corchorus capsularis).—Experimental work on jute was carried on in collaboration with Mr. Finlow, who is reporting on the results.

A Seed Drill was constructed during the year and an area sown with it this season. It is hoped by the use of this drill to reduce the seed rate and the cost of cultivation considerably.

The seed-rate (2½ seers per acre) is 2 seers lower than that of raiyat.

Sugarcane (Sacharum officinarum.)—Varietal work has been continued. The Agricultural Chemist is reporting on the yields of the various varieties.

Juar (Sorghum vulgare)—Was a very successful crop, attaining to a great height.

Guinea grass.—The small area under this crop has been considerably extended.

Groundnuts (Arachis hypogœa).—This crop was tried on a small scale. The growth was good, but the hard soil at harvesting time made lifting difficult.

Potatoes (Solarum tuberosum).—Five English varieties were tried as well as the Darjeeling variety.

The crop was attacked by rhizoctonia and had to be harvested prematurely.

Chillies (Capsicum fruitiscens).—A number of varieties are being compared. A few of these varieties were selected by the Economic Botanist, and the others have been received from different districts.

Soil reclamation.—13·5 acres, which had been under jungle, were brought under cultivation during the year.

The two new fields—Shoti East and Burar Tak—are now under cultivation.

Construction work.—One new quarter for the third Assistant to the Agricultural Chemist was built during the year. Three other buildings, which were uninhabitable, were made pucca. Thus the difficulties in housing the staff have been overcome for the time being.

Drainage.—Continued progress was made in the construction of drains, practically all the experimental area being now properly drained. There is still a lot of work to be done under this head.

Implements.—No new implements were bought during the year. A jute drill was constructed at the workshop and has been used successfully.

Cattle.—One casuality has to be reported; 7½ pairs of bullocks were purchased during the year.

KENNETH MCLEAN,

Depy. Director of Agriculture, Eastern Bengal.

ANNUAL REPORT OF THE RUNGPUR DAIRY FARM FOR 1915-16.

THE year under report has been marked by activity in building construction work, in land reclamation, and in laying out of the farm.

The farm now consists of the following areas:—

	Bighas.		Bighas.
Under cultivation ...	600	Tanks and thatching grass ...	50
Bamboo groves ...	30	Pasture	200
Roads and drains ...	30	Unreclaimed	50
Farmsteading, etc. ...	40		

At the Annual Provincial Conference held at Dacca in February 1916, it was decided—

(1) that a selection should be made on the milk-yielding capacity of the dam, and

(2) that the cattle-breeding was the most important object of the farm, but that the economic point of view should receive close attention.

Cattle-breeding—As will be seen from the table below, the average yield from the herd works out at only 4 lbs. per day, so that the minimum annual yield of the cows selected for breeding purposes was necessarily low.

This was fixed at 1,000 lbs. per year. Some 20 cows came up to the standard.

Amongst these cows there is much diversity both as regards size and type:—

1915.	lbs.	1916.	lbs.
June ...	3·7	January ...	4·0
July ...	4·4	February ...	4·4
August ...	3·9	March ...	4·0
September ...	3·5	April ...	4·1
October ...	3·5	May ...	4·6
November ...	3·6		
December ...	4·7		

Unfortunately in the beginning of April a severe attack of rinderpest broke out amongst the bullocks. On the 11th April 1916 one bullock was noticed to be off his feed and was kept separate. Next day the case was diagnosed as rinderpest and the animal died that night. The sheds were disinfected and the bullocks were removed to another shed. All the farm animals were inoculated on the 13th and 14th April and again on 23rd and 24th. Towards the end of the month the outbreak subsided, the last casualty occurring on the 24th April.

On the 14th May, however, a cow was attacked, and since then, with a short interval of about a week in the beginning of June, the outbreak has continued. All possible precautions have been adopted. The main sheds have been all vacated, and the animals have been accommodated in temporary sheds in different parts of the farm and have been inoculated five times between April and June. The attack has been very severe amongst the sucking calves, there being few recoveries. The Bengal cattle showed no more immunity than those imported from Bihar; in fact the figures are rather the other way. The death-roll is as follows:—

Cows ...	9	Bullock ...	1
Young stock ...	49	Bull ...	1

The following statement shows the number of animals on the farm on the 30th June 1916:—

Cows ...	99
Calves—	
Males ...	4
Females ...	14

(Young stock) 1 year and above—

Males	... 26	Bullocks ...	... 58
Females	... 31	Bulls ...	... 2 (1 young).

Crops.—The actual and normal rainfall for the year is tabulated below:—

Months.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1915.				
July	12·89	18	15·89	15·0
August	12·52	14	12·80	13·7
September	9·79	7	14·24	13·3
October	4·14	8	4·87	4·0
November	0·32	1	0·12	0·2
December	Nil	Nil	0·05	0·2
1916.				
January	Nil	Nil	0·50	0·9
February	0·29	2	0·54	1·2
March	Nil	Nil	1·25	1·8
April	4·61	8	3·00	4·3
May	3·33	4	10·66	11·5
June	18·86	17	18·00	15·7

Cultivation.—Almost the whole of the farm, with the exception of the area reserved for pasture, has now been brought under the plough. The small area, which was put under dubh grass in 1914, was also broken up and sown with jowar as the dubh failed.

The following crops were grown during the year—

Kharif.	Rabi.
Jowar for fodder.	Darjeeling potatoes.
Aus paddy.	Naini Tal potatoes.
Jute.	Country ditto.
Cowpea and dhaincha for green-manuring.	Sumatra tobacco.
Sugarcane.	Country ditto.
	Mangel Wurzel, Carrots, Oats and peas, Guinea grass } for fodder.

Sugarcane.—Great difficulty was experienced in crushing the sugarcane as the whole work had to be done with bullocks and ordinary mills. The work was carried on till April, and a small area, where the growth was poor, was not crushed at all.

Cuttings, which were obtained from outside, did not germinate well, and the comparative tests are not of much significance. An outturn of 24 maunds 9 seers per bigha was obtained from the best block of gandari (2·66 acres). The other blocks did not give outturns approaching this.

Paddy.—The following table shows the varieties of winter paddy planted and the outturn per acre obtained from each. These outturns were obtained from comparatively large blocks, which are not quite uniform, nor were the varieties transplanted at the same time—

Name of paddy.	Area planted in acres.	Actual outturn in lbs.	Outturn per acre in lbs.
Kataribhog	0·759	910	1,266
Josoa	7·788	11,715	1,506
Shamrah	7·293	11,927	1,586
Bhabachandrabhog ..	0·181	320	1,742
Betho	14·223	17,961	1,594
Gotabazal	...	3,569	...

Four varieties of paddy supplied by the Economic Botanist were grown in four duplicate plots. The results are tabulated below :—

Name of paddy.	Area planted in acres.	Actual outturn in lbs.	Outturn per acre in lbs
Lohadang	0·23	410	1,757
Ditto	0·107	231	2,132
Paikarbor	0·148	258	1,720
Ditto	0·132	235	1,762
Dacca, No. 1	0·148	306	2,040
Do., No. 1	0·115	286	2,451
Lambachikan	0·165	293	1,758
Ditto	The result of this plot was not recorded.		

It will be seen that Dacca No. 1 is by far the best of all the imported or local varieties. During the coming season it is proposed to continue these tests and also to put down a large area under Dacca No. 1.

Jute.—The following table shows the results of testing Kakya Bombai (Fibre Expert's selected) against the local Hewti :—

VARIETY.	Area.	Actual outturn.	Outturn per acre.
	Acres.	lbs.	lbs.
Hewti	0 20	133	665
Do.	0·20	123	615
Kakya Bombai	0·20	178	890
Ditto	0·20	289	1,445

These tests are being continued at the demonstration farm. An area of about 4 acres has been reserved for the Fibre Expert for testing his pure line cultures.

Tobacco.—Sumatra tobacco was grown on 0·66 acres. This variety has not turned out well, conditions apparently not being suitable.

The following varieties of country tobacco were planted on 10·66 acres—

(1) Bhengi.
(2) Mena bhengi.
(3) Naokhol.
(4) Godra
(5) Pus, type No. 11.

Potatoes.—The following table shows the outturn of the different varieties of potato. These were all grown on a fairly uniform block. The Darjeeling variety fetches about As. 6 per maund less than the Naini Tal and about As. 12 per maund less than the country. It is advisable to grow the Darjeeling variety when a ready market is available, as the outturn is so much greater. The English varieties gave very good results at the demonstration farm last year, and it is proposed to plant a fairly large area if seed is available—

VARIETY OF POTATO.	Area.	Actual outturn.	Outturn per acre.
	Acres.	lbs.	lbs.
Darjeeling	3·165	43,825	13,839
Naini Tal	2·165	11,745	5,421
Country (Silbilati)	0·627	4,136	6,597

Fodder crops.—Carrots gave much better results than mangels. Although the germination was defective, an outturn of 2,920 lbs. per acre was obtained. It was found necessary to feed them off as they matured, as they could not be stored for any length of time.

The area under Guinea grass is being extended. A large number of Australian grasses was supplied by the Director of Agriculture for experimental purposes. They were sown at the end of the rains, but unfortunately none of them germinated. Lucerne germinated badly, and its growth was poor. It is doubtful whether the soil and climate of Rangpur will permit of the profitable cultivation of this crop.

Difficulty is experienced in supplying green fodder for four months in the year—from the middle of March to the middle of May and again during October and November. This difficulty can be partially solved by growing quick-growing catch crops, such as cowpea or matikalai, but still provision must be made for storing green fodder for three months in the year. It will be necessary to build a silo to get over this difficulty.

Reclamation and construction.—The area beyond the Skrine canal was cleared and roughly levelled. This will be used for pasture.

Two small tanks were deepened and the surrounding areas planted with plantain shoots. The whole of the Tajhat block has been cleared, levelled and brought under cultivation. Drains were cut round the main blocks, and it is hoped that this will effectively deal with higher lying land. With the exception of a small area in Nurpur, practically the whole farm has now been cleared of jungle. A small beel in Asadpur requires deepening.

A machine and engine shed has been constructed at a cost of Rs. 3,800.—

Receipts and Expenditure.

	Rs.	A.	P.
Expenditure—			
Special contingencies	13,986	5	0
Recurring expenditure	33,485	14	9
Value of cattle food held over from previous year's stock	874	0	0
Total ...	48,346	3	9
Receipts—			
Amount credited into the treasury	16,375	2	2
Stock in hand	3,972	12	0
Bills outstanding	2,028	10	9
Total ...	22,376	8	11
Deduct—Value of farm produce of previous year sold and realised during the present year ...	2,164	7	3
Total ...	20,212	1	8

Staff.—Mr. J. N. Chakravarty, Superintendent of Agriculture on special duty, continued in charge of the farm. Up to the end of the financial year he also supervised the demonstration work in the district—the Burirhat farm and the Rangpur demonstration farm.

His energies are now confined to the work on the dairy farm.

Training.—Seventeen apprentices were trained on the farm during the year.

Visits.—His Excellency the Governor of Bengal visited the farm.

The farm was also inspected by Mr. Coventry, Agricultural Adviser to the Government of India, by the Director of Agriculture, and by the Deputy Director of Agriculture. Visits were paid by the Divisional Commissioner, Collector, Captain Matson, Assistant Director, Military Dairy Farms, Northern India, the Fibre Expert, and by the Deputy Director of Agriculture, Western Bengal.

During the sitting of the North Bengal Literary Conference at Rangpur in April, the farm was visited by the Hon'ble Justice Sir A. T. Mukherjee, Hon'ble Justice A. Chowdhury and a large number of delegates.

KENNETH MCLEAN,

Deputy Director of Agriculture, Eastern Bengal.

ANNUAL REPORT OF THE RANGPUR DEMONSTRATION FARM FOR THE YEAR 1915-16.

THIS small farm of 20 acres has changed hands several times since it was started, at one time being administered by the Rangpur Agricultural Association, and at another by the Agricultural Department. Since 1911 the farm has been worked by the Agricultural Department as a demonstration farm, but at the Provincial Agricultural Conference held at Rangpur on February 1915 it was agreed to add to its functions by making it a seed-producing farm for the district.

It is situated close to the town of Rangpur, the soil being a rich moist loam of light texture (*vide* Dr. Leather's report detailed in the Annual Report of 1915).

The rainfall for the year is tabulated below :—

Months.	ACTUAL.		NORMAL.	
	Rainfall.	Days.	Rainfall.	Days.
1915.	Inches.		Inches.	
April	0·38	1	3·01	4·3
May	25·76	18	10·66	11·5
June	15·52	19	18·00	15·7
July	12·89	18	15·89	15·0
August	12·52	14	12·80	13·7
September	9·79	7	14·24	13·3
October	4·14	8	4·87	4·0
November	0·32	1	0·12	0·2
December	Nil	Nil	0·05	0·2
1916.				
January	Nil	Nil	0·50	0·9
February	0·29	2	0·54	1·2
March	Nil	Nil	1·25	1·8

Work done during the year.

Aus paddy.—Three local varieties were compared for yield resulting as follows :—

Name of paddy.	Area.		Actual outturn.	Outturn per acre.
	B.	K.	lbs.	lbs.
Chapalo	3	5	1,487	1,372
Dhalkachai	0	16	641½	2,400
Sonamail	0	19	703	2,216

The former is a very early ripening variety useful in cases where transplanted paddy follows aus, selection works being carried out on all the varieties.

Aman paddy.—Eight selected varieties were grown on the farm.

Dacca No. 1 (the Economic Botanist's selected variety) gave an outturn of nearly 33 maunds per acre in one case and 25 maunds on another area where the soil was very poor.

One variety, Lombachikan, gave a higher yield, but it had the advantage of being grown on the best land on the farm.

The results are tabulated below :—

Name of paddy.	Area.	Actual outturn.	Outturn per acre.
	B. K. CH.	CWT. QR. LB.	T. CWT. QR. LB.
Dacca No. 1	0 5 14	2 1 4	1 3 1 11
Picarbor	0 6 0	2 0 21¾	1 1 3 21½
Lohadung	0 4 7	1 2 0½	1 0 1 9
Lombachikan	0 6 0	1 3 0	1 4 3 23
Kataribhog	1 17 0	9 1 4	0 15 2 15½
Badshabhog	1 2 8	6 0 18	0 16 1 20
Joshoa	0 6 9	1 3 0	0 15 3 24
Batho (transplanted) ...	3 15 0	20 1 16	0 15 2 27

Jute.—The variety Kakya Bombai No. 7 (Fibre Expert's selected) was sown for comparison with the local Hewti, but owing to the large demand for the seed the crop was kept for seed. The crop was excellent, the height of the plants varying from 12 feet to 13 feet with a corresponding thickness.

The variety Hewti gave an outturn of 18 maunds per acre.

Sugarcane.—The two varieties, Dacca Gandari and B 147 were grown for seed supply.

Two new varieties—B 3412 and Red Mauritius—were tested for the first time.

Rabi crops.

Potatoes.—Seven varieties were tested. The following table gives the yields. The English potatoes were of fine quality, but they do not store well :—

Names.	Area.	Outturn.	Outturn per acre.
	B. K. CH.	T. CWT. QR. LB.	T. CWT. QR. LB.
Magnum-bonum	0 13 0	1 6 0 15	5 19 3 12
Abundance	0 2 14	0 8 0 2	8 7 1 9
Superlative	0 2 14⅕	0 7 0 4	7 6 0 27
Epicure	0 2 14⅕	0 7 0 9	7 7 0 21
Up-to-date	0 2 15½	0 7 1 6	7 7 2 7
Darjeeling	0 2 15½	0 5 2 11	8 15 1 11
Naini Tal	1 2 0	1 8 3 16	3 18 0 24

Wheat.—Pusa No. 6 wheat was tried for the first time, but the season proved unsuitable for the variety, an outturn of only 9 maunds per acre being obtained from manured land.

Lentils gave an outturn of 10½ maunds per acre.

Khesari and gram were not successful.

The vegetable garden added considerably to the revenue of the farm, cabbages particularly being in demand.

One-forteith of an acre was put under flax for the Fibre Expert and gave an excellent crop.

Seed distribution.—The following seeds were distributed :—

	Variety.		Cwt.	Qr.	Lb.	Cwt.	Qr.	Lb.
Aus paddy ...	1. Sonamail	...	... 3	0	24	7	1	2
	2. Dhalkachai	...	... 0	2	24			
	3. Chapalo	...	... 3	1	10			
Jute ...	1. Kakya Bombai	...	... 1	2	13	2	3	16½
	2. Local Hewti	...	... 1	1	3½			
Aman paddy ...	1. Dacca No. 1	...	... 5	0	0	14	1	4
	2. Kataribhog	...	... 6	3	4			
	3. Joshoa	...	... 2	2	0			
Sugarcane cuttings		...	...			22,900	0	0

Receipts and Expenditure.

Receipts—

		Rs.	A.	P.
Credited into the treasury	...	927	3	0
Bills outstanding	...	784	14	3
Value of stock in hand	...	295	0	0
Total	...	2,007	1	3

Expenditure.—

	Rs.	A.	P.
Feed of cattle ...	152	12	9
Seeds, implements, and manures ...	194	7	0
Wages of labourers ...	1,678	13	9
*Petty repairs ...	157	11	9
Railway and steamer freights ...	8	14	6
Service postage stamps ...	15	0	0
Office expenses and miscellaneous ...	192	4	3
Total ...	2,400	0	0

*Of this, a sum of Rs. 105 was incurred for the purchase of one sugarcane-crushing mill and two boiling pans.

Training of apprentices.—Three apprentices were trained at the farm.

Inspections.—The farm was inspected by all the officers of the Department, as well as by the Collector of the district.

Staff.—Babu J. N. Chakravarty. Overseer, remained in charge of the farm. Up to the end of the financial year he worked under the supervision of the Superintendent of Agriculture, Rangpur. Since that time he has been directly under the Deputy Director of Agriculture.

KENNETH MCLEAN,

Depy. Director of Agriculture, Eastern Bengal.

ANNUAL REPORT OF THE BURIRHAT FARM, RANGPUR, FOR THE YEAR 1915-16.

THE Burirhat Tobacco Farm is situated on the borders of the tobacco-growing tract, 5 miles north of Rangpur town.

It is 52 acres in extent and is divided into five blocks. It was previously supposed that only 5 to 10 acres were suitable for tobacco, but the work done this year has proved that, with proper treatment, any part of the farm may produce good leaf.

The soil is a sandy loam with a sandy sub-soil and is deficient in lime.

The rainfall table for the year is given below :—

Months.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1915.	Inches.		Inches.	
April	0·66	1	3·01	4·3
May	20·72	15	10·66	11·5
June	19·65	14	18·00	15·7
July	9·24	14	15·89	15·0
August	13·75	13	12·80	13·7
September	10·21	5	14·24	13·3
October	2·81	7	4·87	4·4
November	Nil	Nil	0·12	0·2
December	Nil	Nil	0·05	0·2
1916.				
January	·03	1	0·50	0·9
February	2·44	3	0·54	1·2
March	Nil	Nil	1·25	1·8

Heavy downpours of rain in September proved very disastrous, as the seed-beds were badly damaged and many plants lost.

February, and particularly March, were exceedingly dry months and affected the curing of the Sumatra tobacco.

The following table gives the areas and crops grown during the year :—

	Area in acres.	Blocks.
Bhadoi.		
Cowpea (*Vigna kaliang*) green manure ...	13·55	A, C.
Jaur (*Sorghum vulgare*)	1·00	C.
Aus paddy (*Oryza sativa*)	11·75	B, E.
Fallow (grazing area)	12·00	
Rabi.		
Tobacco (*Nicotiana tabacum and Nicotiana rustica*)—		
Local	5·33	A, C, E.
Sumatra	1·33	
Oats (*Avena sativa*)	26·20	A, B, C, D, E.
Lentils (*Arvum lens*)	·33	B.
Gram (*Cicer arietum*)	·66	B, D.
Peas (*Pisum arvense*)	·33	B.
Wheat (*Triticum sativum*)	4·00	D.

The experimental works carried on during the year may be placed under the following heads :—

(1) The growing of Sumatra tobacco for cigar wrappers.
(2) Collecting and comparing the different varieties of tobacco grown in the Province.
(3) Selecting and improving the local variety of tobacco.
(4) Manurial experiments on tobacco.

(1) *Sumatra tobacco.*—The war has affected the price of Sumatra tobacco considerably, and the best offer received for last year's crop was 6 annas per pound as compared with Re. 1 per pound in the previous year. Attempts are therefore being made to produce cheroots locally. These promise to be successful, and, should the Rangpur cheroot become popular, a new industry will arise in the Rangpur district.

The leaf produced this year, despite adverse climatic conditions, is of fine quality.

(2) *Comparison of local varieties.*—Seeds of 34 Bengal varieties of tobacco were collected and grown on the farm. The characteristics of the various varieties were studied and pure seed kept from each. These will be grown during the next year, and a further study will be made of their characters. The study of these varieties has already shown that there is room for improvement in many districts.

No outside varieties appear to be able to compete with the Rangpur varieties as regards yielding power. One very promising cheroot tobacco has been procured from Chittagong.

(3) *Improvement of the local variety.*—Single plants have been selected with a view to improving the tobacco grown for the Burma market. The two main points kept in view are—

(1) yield;
(2) the occurrence of spots on the leaf.

(4) *Manurial experiments.*—The value of green-manuring with cowpea has been established and is now being demonstrated in the tobacco tract.

Tests of the relative value of various potash manures were undertaken, but results are not yet available

Implements.—A Spring-Tooth harrow has been added to the stock of implements and has proved very useful.

Staff.—Babu Jamini Kumar Biswas has been again appointed Superintendent of this farm. He has done excellent work both in the cultivation and curing of the tobacco crop.

Inspection and visits.—The farm was inspected by the Hon'ble Member and by the Director of Agriculture and myself on several occasions.

Receipts and expenditure.—The total expenditure, not including the establishment, was Rs. 4,510-14, whilst the receipts amounted to Rs. 483-3 The stock in hand has been valued at Rs. 3,795-10-9.

KENNETH MCLEAN,
Deputy Director of Agriculture, Eastern Bengal.

ANNUAL REPORT OF THE RAJSHAHI EXPERIMENTAL FARM FOR THE YEAR 1915-16.

THE Rajshahi Experimental Farm is situated on the outskirts of the town of Rampur-Boalia in the Rajshahi district. It serves as an experimental station for the western district of the Rajshahi Division.

The farm extends over an area of 63 acres, 50 acres being under cultivation. One-third of cultivated area is low land suitable for transplanted paddy and jute.

The tract of soil which the farm represents differs from that of most parts of Eastern Bengal in containing a comparatively high percentage of lime. It is low in potash, phosphates and organic matter (*vide* Dr. Leather's report reproduced in Annual Report of 1915):—

Rainfall.

MONTHS.	NORMAL.		ACTUAL.	
	Rainfall.	Days.	Rainfall.	Days.
1915.				
April	11·81	2·9	0·48	2
May	5·56	7·7	7·96	6
June	10·81	12·6	16·17	16
July	11·45	15·1	10·89	14
August	10·75	14·7	5·87	17
September	10·40	12·4	6·94	14
October	4·46	11·9	1·47	6
November	0·31	0·6	0·39	2
December	0·06	0·2	Nil	Nil.
1916.				
January	0·34	0·8	Nil	Nil.
February	0·84	1·3	Nil	Nil.
March	1·15	1·6	Nil	Nil.

From the above table it will be noticed that from August onwards the rainfall was deficient. Crops consequently suffered.

Sugarcane suffered from the drought at the end of the season and ripened prematurely.

The rabi crops, however, were chiefly affected, the only crop which gave a fair return being gram (*Cicer arietum*).

Pusa No. 6 wheat, which was tried for the first time, was practically a failure on account of the drought.

Experimental Results.

Sugarcane.

Comparative Tests.

Area.	Varieties.	Number of canes.	Weight of canes.	Weight of juice.	Weight of gur.
Acre.			Cwt. lbs.	Cwt. lbs.	Cwt. lbs.
1/10	Vendamukhi ...	2,313	65 90	47 82	8 54
1/10	Puri	2,517	51 38	37 64	5 109
1/10	Striped Tanna ...	1,341	65 76	45 44	8 21
1/10	Yellow Tanna ...	1,400	65 6	47 51	8 19
1/10	B 147	1,803	63 50	44 80	7 104

The local cane, Vendamukhi, gave the highest outturn, and, as the juice contains a high percentage of sucrose, it is a valuable cane. It is, however, soft-skinned and is thus liable to damage from pigs and jackals.

B 147 has again given good yields, as have Striped and Yellow Tanna. As the last two varieties yield juice of a low sucrose content, B 147 has been chosen for distribution except in districts where wild pigs are numerous. The further propagation of Striped Tanna has been discontinued on the advice of Dr. Barber.

Manurial experiments on sugarcane.

The effect of manuring with a mixture of Ammonium Sulphate and Superphosphates was compared with the usual dressings of cake, but the results showed little or no difference either way.

This experiment was, however, somewhat late in being started, and the manurial plots were more affected by the drought than the others.

Experiments on Aman (transplanted) Paddy

Varietal.—Four varieties were tested, including the Economic Botanist's Dacca No. 1 (Indrasail selected). The plots concerned had already yielded a crop of aus paddy. Dacca No. 1, as elsewhere, gave the highest yields and will be tested more extensively in the coming season. Kataribhog gave a surprisingly high yield. It, however, gives a very fine highly scented rice, which is only eaten by the upper classes and hence is not of wide economic importance.

Experiments on Aus Paddy.

Varietal.—The local paddy gave a much higher yield than the imported ones. These latter germinated and tillered badly, and at one time looked as if they would go out altogether. A top-dressing of Sodium Nitrate, however, pulled them through, and some outturn was eventually obtained. Selection work will be carried out this season from the local variety, Kheshia Panja.

Manurial.—The experimental work with bonemeal was unfortunately lost as the variety Boaljuri germinated badly and died out.

Potatoes.—The crop suffered badly from the drought. Five new varieties were tried on a small scale, viz.—

(1) Up-to-date.
(2) Abundance.
(3) Magnum-bonum.
(4) Superlative.
(5) Epicure.

Jute.—*Corchorus capsularis* (variety K B No. 7) was grown for seed, 5 maunds 36 seers of seed being obtained from 1·25 acres.

Corchorus olitorius (variety Serajganj Tosha) was grown on $3\frac{2}{5}$ acres. One-sixth acre was kept for seed, and the remainder was retted for fibre, giving an outturn of 59 maunds 4 seers. Mr. Finlow continued his selection work on *Corchorus olitorius*.

Buildings and improvements.—Two new quarters were constructed during the year—one for the fieldman clerk and the other for the apprentices. It is hoped that an office will be built this year to complete the equipment of the farm in buildings.

The whole of the farm is now properly drained and the roads have been put in order

A tank, which was much required, was excavated in the south-west corner of the farm, and the area surrounding the staff quarters, which in the rains had been very muddy, was raised and levelled.

The marsh fence and gates were put in order.

Implements.—No new implements were tested during the year under report.

Financial returns.—Sugarcane was the most profitable crop grown on the farm, as the following figures show —

		Rs.
1 acre—sold as chewing canes	...	420
8 acres { 324 cwt. of sugar at Rs. 8-14 per cwt.	...	2,875
8 acres { 123,000 cuttings at Rs. 5 per 1,000	...	615
Total	...	3,910

The cost of cultivation of ratoon cane worked out at Rs. 50 a bigha and plant cane at Rs. 70 per bigha, giving a total cost of Rs. 1,615. This leaves a profit of Rs. 2,295 for 9 acres or Rs. 255 per acre. This of course does not include capital expenditure charges and salaries of staff.

The total receipts for the year from April 1915 to March 1916, including the valuation of stock in hand, were Rs. 6,903-11, whilst the expenditure amounted to Rs. 5,775-11-9 exclusive of staff. The cost of buildings erected by the Public Works Department amounted to Rs. 4,044.

Staff.—Babu Kali Das Roy has held charge as Superintendent during the year and has displayed great energy and keenness.

Visits.—The farm was visited by numbers of cultivators. A co-operative society has been started in the vicinity of the farm to assist members in procuring improved seed and implements. Several officials and a number of zamindars and local gentlemen visited the farm.

KENNETH MCLEAN.

Depy. Director of Agriculture, Eastern Bengal.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, BURDWAN DIVISION, 1915-16.

Staff.—The officers employed during the year under report consisted of one Superintendent of Agriculture for the Division, 2 District Agricultural Officers and 6 Fieldmen Demonstrators.

The two District Agricultural Officers were, in the first part of the year, placed in the districts of Midnapore and Burdwan ; but with the increase of work in the districts of Bankura and Birbhum, the District Agricultural Officer of Midnapore was transferred to Bankura and the District Agricultural Officer of Burdwan to Birbhum.

Associations.—The Divisional, District and Branch Agricultural Associations tried to help the members in carrying out demonstration work in their lands in the usual way. The speciality of the year under report is that some of the Associations helped poor *bonâ fide* cultivators with seeds and manures recommended by the Agricultural Department ; formerly members only used to enjoy this privilege. The Superintendent of Agriculture attended all the Association Meetings with the exception of one or two. He could not attend these owing to pre-engagement elsewhere.

Exhibitions and Fairs.—Owing to Famine and the War, the number of Exhibitions and Fairs held was less than that of the last year. But the Suri Mela, especially the Agricultural Branch was a great success. Demonstrations of the use of improved tools, excellent results of paddy with dhaincha green manuring and the use of bonemeal, and the success in groundnut cultivation in the district attracted the attention of the public. The following officers from this Department took an active part in this Exhibition :—

(1) Director of Agriculture,
(2) Deputy Director of Agriculture, Western Bengal,
(3) Superintendent of Agriculture, Burdwan Division,
(4) District Agricultural Officer, Birbhum,
(5) Superintendent of Sericulture, and his Assistant,
(6) Weaving Master, Bengal,
(7) Superintendent of Burdwan Farm.

There were lantern lectures on five days out of six. The advantage of new tools, new crops and the use of artificial manures was explained to a large assembly every evening with the help of illustrations. Leaflets and pamphlets were distributed among the literate cultivators.

A similar demonstration was conducted on a smaller scale at the Hetampur Mela. The third mela was at Serampore. This mela lasted for one month and during that period departmental seeds, manures and tools were exhibited, while leaflets and pamphlets were distributed to the public.

Demonstration work.—The Superintendent was out on tour for 190 days in the year under report in all the six districts of the Division. About half of this time was spent in the districts of Bankura and Birbhum in connection with demonstration and famine works.

The demonstration works in progress in various districts of the Division are :—

(I) Manures :—

(*a*) Green manuring with dhaincha,
(*b*) Bonemeal,
(*c*) Castor-cakes,
(*d*) Conserved cowdung,
(*e*) Tank silt.

(II) Crops :—

(*a*) Aman paddy, namely Kartick-Sal, Kataribhog, Badshabhog, Samudrabali, Dadkhani ; Aus :—C. P. Fine Aus.
(*b*) Sugarcane—Local varieties, Mauritius, Tanna and Venda Mukhi of Raghshi.
(*c*) Potatoes—Naini Tal and Darjeeling.
(*d*) Introduction of groundnut cultivation in the Division, especially in the districts of Birbhum and Bankura.
(*e*) Introduction of other crops, namely—Patna rahar and gram, Raipur mustard, Kalimpong maize, Rungpur tobacco, Muzaffernagar wheat, Mr. Finlow's jute and Ceylon papaya, etc.

(III) Implements—

Don and chainpump for irrigation, three-rollered crushing mill and shallow pans for *gur*-making, Planet junior hoe (single-wheel) and Meston plough for tillage of light soil.

(IV) Seed selection—

Specially of paddy and jute.

For the want of adequate rains the crops failed to a considerable extent, especially in the districts of Bankura, Birbhum and Midnapore. Nevertheless the good effects of bonemeal and dhaincha green manuring on paddy were very apparent.

Special work.—The Agricultural Department employed 13 extra men on relief work in various thanas in the district of Bankura for two months. Seeds of potato, wheat, barley, gram, etc., were supplied to cultivators, and the cultivation of these crops was explained. Crop-cutting experiments on paddy were carried out.

Owing to scarcity of fodder an experiment on cactus as a fodder was carried on by Mr. P. G. Krishnan, District Agricultural Officer, Bankura, at

the expense of the District Board. This proved a success. A leaflet was published on this experiment for circulation among the public by the Sub-divisional Officer, Bankura.

The crop-cutting experiments on paddy and sugarcane in the districts of Howrah and Burdwan were also carried out by the officers of this Department.

At the request of the Collector of Birbhum an assembly of about a thousand cultivators were entertained by a lantern lecture on improved agriculture for three hours by the Superintendent in the yard of Babu Abinash Chandra Banerjee, M.A., at Sultanpur.

Seed store.—Though the Bengal Central Seed Store was abolished and work transferred to the two seed stores of Western Bengal, there were considerable demands on the Burdwan Divisional Store. The seed supply to provinces other than Bengal is continued as before from Howrah, and the supply of seeds and manures in this Division has increased. The following quantities of seeds, manures and implements were supplied during the year—1st April 1915 to 31st March 1916. Seeds—763 maunds (28¼ tons). Manures 1,317½ maunds (49 tons) and implements 20. In addition 77,370 cuttings of sugarcane were supplied from various farms.

The expenditure and the sale-proceeds of the store in the year from 1st April 1915 to 31st March 1916, are shown below :—

	Rs.	A.	P.
(*a*) Establishment and rent	992	8	0
(*b*) Contingencies	370	7	3
(*c*) Seeds and manures, etc.	1,480	0	9
Sale-proceeds	994	15	3

The contingency.—Expenditure of Superintendent's office for the year was Rs. 349-14-0.

Jute forecast work—Was carried on by the Superintendent. He was helped by two District Agricultural Officers, five Demonstrators and 11 temporary jute clerks.

J. N. SIRKAR,

Superintedent of Agriculture, Burduan Division.

HOWRAH,

The 14th July 1916.

ANNUAL REPORT OF Mr. H. P. MITRA, SUPERINTENDENT OF AGRICULTURE, PRESIDENCY DIVISION, BENGAL, FOR THE YEAR FROM 1st JULY 1915 TO 30th JUNE 1916.

I SPENT altogether 114 days on tour, out of which 21 days were spent outside the Division, 12 days being spent at the Chinsurah Farm and 7 days for the Dacca Conference. The remaining 95 days were spent as follows :—

Murshidabad	48	days.
24-Parganas	20	„
Jessore	18	„
Nadia	8	„
Khulna	1	„
	95	„

during which time I was occupied with jute forecast work, demonstration work and attending meetings of Agricuitural Associations and Exhibitions. During the year 1915-16, I was assisted by—

One seed store clerk, Babu Hiralal Choudhury.

One District Agricultural Officer, Babu Sachindra Krishna Dutt, B. Ag., and 7 demonstrators—1 Muhammadan and 6 Hindus, belonging to the *bhadralok* class.

Five demonstrators were discharged and one resigned leaving only one. The sanctioned number for the Presidency Division, is 7. Six more should have been appointed from the 1st of April, but owing to difficulties found in selecting candidates, this could not be done.

Jute Forecast work.—For the jute forecast work 13 temporary men were appointed for four months from the 15th May to the 14th September 1915, in addition to the 7 demonstrators I had under me. These 20 men checked the *Panchayats'* figures and made crop-cutting experiments. Roughly speaking about 2 per cent. of the total area was checked by taking actual measurements in most cases. The *Panchayats'* figures seemed to be more satisfactory than those of the previous year and from actual facts it appeared that this system might work well, after a few years' experience on the part of the *Panchayats.*

Seed Store.—The seed store for the Presidency Division was at 27, Upper Circular Road, close to Sealdah Railway Station and conveniently situated for the muffasil people. Altogether 605 maunds of manures, 30 maunds of seeds, 2 chain pumps, 12 iron dones, 1 Meston plough, 3 Planet junior hand hoes and one shallow iron pan for *gur*-making, were supplied from this store. It was not found possible to do more for the shortness of the budget allotment. To overcome this difficulty I got certain companies to agree to supply manures to cultivators recommended by us and to realise the prices from them after the harvest. About 160 maunds of manures were supplied to cultivators in this way. It is, of course, too early yet to say how this system will work.

During the year under review no seeds and manures were supplied through any Co-operative Credit Society, but agricultural demonstration work was started among the members of Taki Rural Co-operative Bank and Nimta Co-operative Bank under our supervision.

The Demonstration work.—The demonstration work in this Division is gradually making as much progress as is possible with the present staff. Successful results have been obtained in most cases and all possible attempts have been made to draw the attention of the neighbouring villages to these results. In fact, we can say that the importance of our work has been recognised by the cultivators and some actual benefit has been derived by them. It can also be understood from the fact that the demands for seeds and manures has increased to an appreciable extent in many centres of our demonstration work. But at the same time it must be admitted that the actual benefit derived by the raiyat from our success has not been in the same proportion as one may reasonably expect in other countries. This is, in my opinion, not due to the conservativeness of the cultivating class as is too often alleged, but to the existing conditions that have handicapped them. They know their business fairly well and I find them ready to adopt any new profitable method if they can manage it. For example, the importance of potato cultivation and of planting thick sugarcanes in place of the common thin variety has been successfully demonstrated in many villages. Those who have got irrigation facilities have taken to them, but the majority of the cultivators in the neighbouring villages, although convinced of the results, dare not grow these for want of water. Consequently the value of our work has been reduced to only a fraction of what is possible.

Application of Manures.

Bonemeal.—The effect of bonemeal, particularly as a lasting manure, is gradually being understood. Last year for want of sufficient rains, we could not get the full value of it in many cases, although, in every case, we got better results than from unmanured plots; and the crops on those plots in the current year seem to be very promising. The increase in yield of *aman* paddy due to application of bonemeal, was in one case as high as 4½ maunds per bigha, in two cases 4 mounds and in six cases, 2 to 3¾ maunds per bigha. These were, of course, successful results. The increase of 1 maund or less per bigha that we obtained in some cases could not be called a success as it barely covered the cost of the manure and the extra labour.

Castor-cake.—The effect of castor-cake on aus paddy, *aman* paddy. jute and potato was very successfully proved in every case. The increase in yield due to application of castor-cake was, from *aus* paddy 2 to 5 maunds per bigha, *aman* 2 to 4 maunds and jute from 1 maund to as high as 3¾ maunds per bigha.

Dhaincha green manuring on aman paddy—Was tried in several places and it showed an increase in yield from 1 maund to 3 maunds of *aman* paddy per bigha.

Chilli Saltpetre and Superphosphate.—Thirteen seers of each per bigha. The year under review was particularly a favourable year for this manure and we got very good results everywhere. We obtained increase in yield of 2 to 5 maunds of paddy and 2 to 3¾ maunds of jute per bigha.

Expert's Selected Seeds.

The Fibre Expert's selected Kakya Bombai seeds—Were tried in some places, side by side with local *olitorius* seeds. Except in two cases the yield of Kakya Bombai was less than that of *deshi*. But the quality of Kakya Bombai fibre, though shorter in length, was found better. The Economic Botanist's selected Indrasail paddy has been sown in 1916. It was not tried last year.

The selection of seeds on cultivator's fields, in this Division, was only begun last year with jute, paddy and rahar crops.

Introduction of more profitable New Crops and better varieties of existing Crops.

Potato.—The cultivation of potatoes in this Division is gaining ground. Last year the results obtained from the Darjeeling variety were very successful, the outturns being about 60 to 80 maunds per bigha. Newly-imported English potatoes acclimatised in Darjeeling were tried in five places. These were sown rather late, as previous arrangements had not been made. The outturn obtained from Magnum-bonum variety in village Jamalpur (District 24-Parganas) was about 64 maunds per bigha. The tubers were large in size and the keeping quality greatly added to its credit. In Kassimbazar they germinated well and for about a month or more the plants looked vigorous, but afterwards they were attacked with disease, and all the plants died. At that time the tubers were of the size of an egg, and there were quite a number of them in each hill. In other three places the yield was not encouraging.

Groundnuts.—Were tried in two places, but did not prove an economic success. The estimated outturn was about 5 maunds per bigha in the village of Ghosepur.

Bangalore papaya.—Was tried in Jessore. Its success induced many persons in that locality to grow these papayas. The fruits were plentiful and of a very large size. The estimated profit was about Rs. 200 per bigha.

Thick varieties of Sugarcanes.—B. 147 and Yellow Tanna grew well, but as they were mostly sold out as chewing canes, it could not be ascertained whether they were economically more successful than local Samsara.

Agricultural Associations.—The members of the Agricultural Association in this Division did more useful work during 1915 16 than in the previous year.

Exhibitions.—Exhibitions took place in the following places:—

1. Banjetia. | 2. Meherpur.

I attended the Banjetia Exhibition. Demonstrations in the use of the hand chain-pump, the bullock-gear chain-pump, iron dons and Planet junior hand hoes were given during the show.

H. P. MITRA,

Superintendent of Agriculture, Presidency Division.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, DACCA DIVISION, FOR 1915-16.

Staff.—The divisional staff consists of one Superintendent, four District Agricultural Officers and 26 Demonstrators.

Tours.—The number of days spent on tour and the important places visited by the officers in the division are shown in the following table :—

Name and designation of the officers.	Number of days spent on tour.	Names of important places visited.
Babu Rajeswar Das Gupta, Superintendent of Agriculture.	343	Faridpur, Mymensingh, Barisal, Calcutta, Narayanganj, Darjeeling, Lakhipur, Rajbari, Goalundo, Singjani, Ati, Kalatia, Manipur, Basbari, Keraniganj, Baira, Khulna, Tarpassa, Munshiganj, Gafargaon, Mirkadim, Dhankunia, Bahar, Fatulla, Bhola, Madaripur, Sarishabari, Charmuguria, Mikli Dampara, Daulatkandi, Dilalpur, Jinjira, Kaoraid, Kamalaghat, Kasipur, Sutiakhali, Dopunia, Tetuljhora, Savar, Kalma, Ramnagar, Bhairab, Bajitpur, Sadakpur, Jamalpur, Muktagacha, Mantola, Khagdahar, Tangibari, Rajabari, Mirpur and Godnail.
Babu Santiprasad Sen Gupta, District Agricultural Officer, Dacca.	228	Narayanganj, Munshiganj, Manikganj, Singalar, Savar, Ati, Aricha, Kaoraid, Fulbaria, Lahajang, Tanjibari, Dhankunia, Baira, Kaliganj, Ramnagar, Ghorasal, Jaidebpur, Tangi, Narsingdi, Raipura, Baradi, Baiderbazar, Mirkadim, Kalma, Malkhanagar, Taltolla, Lessraganj, Godnail, Saidpur, Rupganj and Pubail.
Babu Satindra Lal Sen Gupta, District Agricultural Officer, Mymensingh.	298	Jamalpur, Netrakona, Kishoreganj, Tangail, Gopalpur, Madhabpur, Iswarganj, Muktagacha, Gauripur, Bhairab, Bajitpur, Astagram, Dilalpur, Nikli, Sarisabari, Mitamani, Bangalpara, Gafargaon, Hossenpur, Ramgopalpur, Nandail, Fulbaria, Senbari, Sherpur, Baiganbari, Kalirbazar, Piyarpur, Dapumia, Ramamritaganj, Sutiakhali, Montala, Kursa, Dewanganj, Islampur, Nandina and Narandi.
Babu Debendra Nath Mitra, District Agricultural Officer, Faridpur.	258	Katwali, Bhanga, Sadarpur, Bhusna, Nagarkandi, Madhukhali, Rajbari, Beliakandi, Pangsa, Goalundo, Kotalipara, Gopalganj, Kasiam, Madaripur, Palong, Talma, Dadsi, Banibaha, Haridaspur, Charmugaria and Belgachi.
Babu Surendra Nath Sen District Agricultural Officer, Barisal.	220	Perojpur, Kasipur, Solak, Madhabpassa, Badhalpara, Gauapara, Jhalakati, Swarupkati, Kheperpura, Gaila, Rupatali, Bhola, Gaurnadi, Kalaia, Bauphal, Paranganj, Gangapur, Muladi, Baranaddi, Hularhat and Pataukhali.

The demonstrations undertaken during the year are as follows :—

1. *The introduction of superior varieties of seeds specially raised by experts.*—Mention was made in the last year's report of a large quantity of paddy (*Oryza sativa*) and jute (*Corchorus capsularis*) seeds, raised by the Economic Botanist and the Fibre Expert, being distributed among cultivators for trial alongside their own seeds. The results of these have since been obtained and will be found below :—

District.	Number of cultivators.	Total area of land sown with Expert's seeds.	Extra outturn.	Profit.	Profit per acre.
			Paddy.		
		Acres.	lbs.	Rs. A. P.	Rs. A. P.
Dacca ...	49	5·70	3,634	136 4 6	23 14 6½
Mymensingh ...	44	8·74	2,032	76 3 3	8 14 6
Faridpur ...	...	...	...	...	...
Barisal ...	5	1·22	27	0 15 7	...
			Jute.		
Dacca ...	12	1·05	68	6 13 0	6 7 10
Mymensingh ...	57	5·00	960	96 0 0	19 3 2⅖
Faridpur ...	15	2·00	400	40 0 0	20 0 0
Barisal ...	15	1·68	50	5 0 0	2 15 7½

Over 600 maunds of the Economic Botanist's Dacca No. 1 paddy and 25 maunds of the Fibre Expert's selected jute seeds have been taken up by cultivators this year.

2. *Seed selection in the fields of the raiyats.*—This is the third year of this work. The practice is steadily gaining favour with the cultivators. Summary of the results obtained is given in the following table :—

District.	Number of cultivators.	Total area of land.	Extra outturn.	Profit.
		Paddy.		
		Acres.	lbs.	Rs. A. P.
Dacca	79	24·00	4,188	159 10 9
Mymensingh ...	54	13·66	1,488	55 14 0
Faridpur	40	7·66	1,384	51 14 5
Barisal	25	5·72	4,115	15 6 11
		Jute.		
Dacca	82	19·330	1,100	68 12 0
Mymensingh ...	57	5·320	1,168	73 0 0
Faridpur	48	8·790	1,620	101 4 0
Barisal	5	·338	22	1 6 0

3. *Effect of bonemeal on paddy (Oryza sativa) and jute (Corchorus capsularis).*—This work has been continued with unqualified success. In the Dacca district an average net profit of Rs. 22-3-3 per acre was obtained. In Mymensingh the average net profit works out at over Rs. 12 per acre. It should be mentioned here that the effect of bonemeal remains in the land for over 3 years and the effect in the second and third years has been found to be more convincing. Over 550 maunds of bonemeal have been taken by the cultivators this year.

4. *The effect of bonemeal and lime on red soils.*—This work applies to the jungle tracts in the Dacca and Mymensingh districts. The results of this treatment have been again conclusive. Over 40 maunds of bonemeal and 220 maunds of lime have been taken up by the raiyats in the Dacca district. This year a great expansion is expected.

5. *Introduction of potatoes.*—Potatoes are becoming a popular crop and the demand for seed is increasing every year. In addition to Government advances for the purchase of seed, the Commissioner of the Dacca Division helped with Rs. 5,000 and the Collectors of Mymensingh and Barisal with Rs. 5,000 and Rs. 3,000, respectively—

Districts.	Number of cultivators.	Total area of land in acres.	Outturn in lbs.
Dacca	252	56·14	558,166
Mymensingh	424	75·66	644,160
Faridpur	200	32·77	270,974
Barisal	112	19·50	38,777

Improvement of seed.—For the purpose of improving the stock from which our seed-supply is procured, five improved varieties were imported from England and distributed to cultivators in Darjeeling. The results are promising.

6. *Introduction of superior varieties of sugar-cane.*—The demand for sugarcane cuttings is increasing. The following were supplied in the districts—

District.	Number of cuttings supplied.
Dacca	28,336
Mymensingh	10,000
Faridpur	12,500
Bakarganj	2,000

7. *Proper conservation of cattle dung in pits under sheds.*—People now quite see the usefulness of this method, and the number of pits is steadily on the increase.

8. *Green-manuring with Dhaincha.*—The progress of this work as reported last year is rather slow, but that is only natural.

9. *Introduction of new crops.*—Cultivation of aus and deep-water paddy in Barisal and also transplanted paddy and boro paddy in Faridpur district have been extended. Groundnut and tobacco are also being grown in Barisal and Faridpur. Several cultivators of Dacca and Mymensingh have grown jowar for fodder with success. Penny packets of English vegetable seeds imported by the Deputy Director of Agriculture, Eastern Bengal, were sold mostly to the poorer class of cultivators of the division. The results have been very satisfactory.

10. *Implements.*—Demonstrations of the Planet Junior hand hoe in potatoes, tobacco, sugarcane and garden crops have been carried out throughout the division. Its usefulness has been appreciated by the cultivators. Demonstrations with the Meston plough, Punjab plough and Spring-Tooth harrow have also been given.

11. *Exhibitions.*—Three exhibitions were held in the division, viz., in Dacca, Faridpur and Barisal.

12. *Seed-store.*—Since May last, Government has sanctioned a divisional seed-store at Dacca to facilitate seed distribution. The total expenditure on seeds, manures, etc., amounted to Rs. 2,908-7-6 and the amount realized Rs. 2,952-9-9; of this amount a sum of Rs. 456-15 was received for old stock. There is stock valued at Rs. 420-0-6 in hand; outstanding accounts amount to Rs. 46-12.

6,000 maunds of paddy were procured and despatched to the distressed areas in Mymensingh, whilst nearly 4,000 maunds were purchased and despatched to Assam.

13. *General.*—I would avail myself of this opportunity to express my thankfulness to the Divisional Commissioner and the District and Subdivisional Officers for their kind help and co-operation. The District Agricultural Officers also deserve commendation for their energy and devotion.

R. DAS GUPTA,

Supdt. of Agriculture, Dacca Division.

THE ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, RAJSHAHI DIVISION, FOR THE YEAR ENDING 30th JUNE 1916.

DURING the year under review I was assisted in my work by three district agricultural officers and 16 demonstrators. The district of Rangpur came under my charge from the 1st April 1916.

During the whole year I was out on tour for 310 days. The subordinate officers were also constantly on tour, the number of days in each case varying from 200 to 275 days.

Babu Bhabatosh Dutta was in charge of Pabna, Babu Binodelal Mukherjee of Malda, Babu Jamini Kumar Biswas of Rangpur till the 31st March, and Babu Mohini Mohan Ghosh of Rangpur from 1st April 1916.

The main items of demonstration were as follows:—

(1) Bonemeal on paddy.
(2) The superiority of the Darjeeling variety of potatoes to the local.
(3) Green manuring of potatoes with cowpea, aman paddy with dhaincha and jute with sunnhemp.
(4) Conservation of cattle dung in covered pits.
(5) Residual demonstration in bonemeal.
(6) Introduction of the better varieties of sugarcane among the cultivators.
(7) Seed selection in cultivators' fields.
(8) Distribution of the seeds raised by the Experts.
(9) Fodder crops.
(10) New crops and manures introduced.
(11) Implements.

(1) The application of Bonemeal on winter paddy and other crops.

This manure has been extensively tried in this division, but has not been successful except in Bogra, Hili, Joypurhat, Rangpur and northern part of Rajshahi. In the district of Malda it is being used to manure mango trees. In the district of Rajshahi the manure is used on the mulberry lands and gives fairly good results.

The distribution of plots was as follows :—

	Jute.	Aus.	Aman.	Fruit trees.
Rajshahi ...	...	14	17	393
Bogra ...	4	...	24	...
Malda ...	...	...	2	16
Pabna ...	6	13	...	...
Dinajpur ...	...	12	27	9
Jalpaiguri ...	7	...	14	...
Rangpur ...	...	...	42	...
Total ...	17	39	126	418

(2) Potatoes.

During the year under review two varieties of potatoes from Darjeeling and Nainital were recommended and supplied to the cultivators.

This year about 500 maunds of seed potatoes were supplied in the division. The demand is increasing.

Records of yields were kept only of plots in new centres and in places where the results have not yet been thoroughly established. The following is a list of the distribution of controlled plots district by district :—

	Darjeeling.	Nainital.		Darjeeling.	Nainital.
Rajshahi ...	17	19	Malda ...	60	...
Rangpur ...	43	...	Dinajpur ...	7	12
Bogra ...	30	17	Jalpaiguri ...	10	4
Pabna ...	96	...			

The crop has been very successful wherever it has been tried. In Rangpur, the Darjeeling variety was tested against the local variety in 28 plots, and in each case the former proved superior to the latter.

(3) Green manuring.

The green manuring of plots with cowpea has given very satisfactory results. There were altogether 96 such plots in this division. In many places the cultivators find it very advantageous to graze their cattle lightly on the crop and then plough it down. Green manuring of aman paddy with dhaincha has also given good results, and the large demand for seed proves that they appreciate it. There were altogether 69 plots of aman paddy manured with dhaincha. Green manuring with sunn hemp is practised in Pabna, Bogra and Rajshahi districts.

(4) Conservation of cattle dung in covered pits.

The number of pits has been greatly reduced during the year. There were only 50 pits in the division. The fact that last year was a very bad year and that there were floods in some places will explain the reduced number. In many pits a new feature has been introduced, namely, the addition of a small quantity of bonemeal to each day's collection, the idea being that the bonemeal would be decomposed along with the dung and hence made available as a plant food.

(5) Demonstration of the residual value of bonemeal.

There were 16 plots, of which records were kept. Of these 13 were slightly successful.

(6) Sugarcane.

This year about a lakh of cuttings were distributed to cultivators. The cuttings were obtained from the Government farms, from the cultivators who got our cuttings last year and also from the other districts. The varieties B 147. B 208, Gandari and Shamshara are in great demand for chewing purposes. They are equally good for gur-making. The variety Venda-mukhi is a local cane and hence grows very satisfactorily and the cuttings are easily obtainable. The thicker varieties—Yellow Tanna and Striped Tanna are in great demand in places where pigs attack the crop. The manure used by the cultivators is castor-cake supplemented by cowdung and bonemeal as recommended by the Department. In a few cases Nitrate of Soda is also used. The average yield of gur from those varieties ranges from 75 to 100 maunds to the acre as compared with 36 to 54 maunds of the local variety Khari. Of all the varieties, the Vendamukhi seems to be able to resist drought best.

(7) Seed selection.

During this year seeds selected from cultivators' plots were tested on 12 controlled plots and in 10 of these better results from the selected seeds were obtained.

(8) Distribution of improved seeds raised by the Economic Botanist and the Fibre Expert.

Number of plots—

Rajshahi	... 2	Jalpaiguri	... 1
Pabna	... 6	Khanjanpur	... 4
Rangpur	... 14		

In the districts of Rangpur, Pabna, Jalpaiguri and in Khanjanpur, the Kakya Bombai jute seed has proved itself superior to the local varieties and the demand for these seeds is gradually increasing. In the district of Rajshahi the cultivators grow the Deshi Tosha on an extensive scale and *capsularis* is not generally grown.

(9) Fodder crops.

In Rangpur 4 maunds and 10 seers of Juar seeds were distributed to the cultivators. They are gradually realising the advantage of growing this crop as fodder. Some cultivators were induced to sow Khesari in paddy land in Rangpur, Rajshahi and Bogra. Cowpea as fodder has been introduced in the districts of Rajshahi, Pabna and Bogra. There were 17 plots of Matikalai, 32 of Gohama, and 4 of Patna carrots also in the division. This year the four fields of Patna carrots gave an average yield of about 80 maunds of green food per bigha.

(10) New crops and manures introduced.

During the year under review we tried to introduce the following field and garden crops among cultivators:—

(*1*) *Onions.*—There were altogether 10 plots under onion. The manure in each case was 6 maunds of castor-cake to the bigha and the average outturn of

the plots has ranged from 327 to 396 maunds to the acre, the net calculated profit ranging from Rs. 390 to 450 per acre, the cultivation being very intensive.

(2) *Horticulture.*—Cabbages, cauliflowers, turnips, spinach, etc., have been introduced by us in some of the interior villages of Rajshahi and Bogra. During the year 1915 the process of propagation by transplantation was demonstrated. The cultivators are now able to raise their own seedlings.

(3) In many places in the Rajshahi district the cultivators have been induced to lay out small fruit gardens, and every possible help has been given to them for procuring plants, manures, etc.

(4) In the district of Rajshahi, Ramphal plantains were introduced.

(5) In some places, the Chittagong Hill kachu (*Colocasia*) has been introduced, and there seems to be a great future for this crop.

(6) In Rangpur, Kataribhog paddy has been tried in different plots.

Manures.

(1) The Chilian Nitrate Company have kindly given us a free supply of Sodium Nitrate, and it has been tried on many crops requiring forcing. The manure is being cautiously tested on sugarcane, Aus paddy and potatoes.

(2) At the suggestion of Babu Binode Lal Mukherjee, District Agricultural Officer of Malda, we have tried Nim-cake in fields infested with white ants. The results have been very encouraging. Further tests will be conducted this year.

(11) Implements.

The working of the Meston plough, Planet Junior Hand-hoe, and Don have been extensively demonstrated in the districts of Rajshahi, Bogra, Pabna, Rangpur and Malda. The working of the knapsack sprayer has been shown in Rangpur, Rajshahi and Jalpaiguri. The following were sold to the public :—

Meston ploughs	...	205	Sprayers	...	4
Hand-hoes	...	22			

N. GUPTA,

Superintendent of Agriculture,
Rajshahi Division.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, CHITTAGONG DIVISION for 1915-16.

THE regular routine work of the Department was carried on as usual, and as such may be classified as under—

(1) Demonstration on the value of manures as follows :—

- (*a*) Bonemeal on aus and aman lands.
- (*b*) Green-manuring on aman.
- (*c*) Bonemeal and saltpetre on aus.
- (*d*) Manures for potatoes.

(2) Demonstrations of selection of seeds on raiyats' fields by the raiyats themselves.

(3) Extension of improved varieties of—

- (*a*) Jute.
- (*b*) Sugarcane.

(4) Introduction of new crops—

Potatoes.

(5) Improvements in agricultural practices—

(*a*) Single seedling transplantation of rice.
(*b*) Use of Meston ploughs, hand hoes, etc.
(*c*) Use of chain pumps for irrigation.

Our demonstration work this year was largely affected by floods.

I. *Demonstration on Bonemeal.*—The abstract of the results for the different localities as shown below points out clearly that we have been able to show that bonemeal is an allround manure for paddy in the Sadar subdivisions of Noakhali and Comilla. In Chittagong we have not been very successful with this manure. A further study of the soils seems necessary :—

Names of places.	Number of experimental plots.	Number of profitable plots.	Outturn of the profitable plots per acre.	Outturn of check plots per acre.	Profit.
			lbs.	lbs.	Rs. A.
Noakhali	22	17	1,576	948	14 9
Comilla	10	5	1,466	1,184	21 15
Feni	13	4	1,584	1,136	14 8

In Brahmanbaria, aman could only be transplanted in the four plots where the bonemeal was applied to the aus crop—unfortunately destroyed by flood. In all these cases there has been a profit.

The statement below shows the increase in the use of manures since the beginning of the work of the Department in this division :—

Manure—Bonemeal.

Locality.	1913-14.	1914-15.	1915-16.	1916-17.
	lbs.	lbs.	lbs.	lbs.
Comilla	480	1,200	1,280	2,240
Brahmanbaria ...	960	2,800	6,000	960
Chandpur	960	1,200	...	640
Tippera district ...	2,400	5,200	7,280	3,840
Noakhali, Sadar ...	960	1,200	10,080	41,200
Feni	...	1,200	1,040	2,240
Noakhali district ...	960	2,400	11,120	43,440
Chittagong	960	800	1,160	80
Satkania	...	...	800	...
Chittagong district ...	960	800	1,960	80
Total ...	4,320	8,400	20,360	47,360

Green-manuring was tried in Noakhali district, where the practice is to fallow every fifth or sixth year.

No manurial work on potatoes was undertaken, as the crop has been only recently introduced in this division.

II. *Demonstrations on seed selection.*—No remarks are necessary regarding this work.

III. *Introduction of new varieties—Jute.*—Mr. Finlow's improved jute seed was grown in 13 plots in Comilla and in Noakhali. Trials are being repeated this year in five centres, viz., Chatalpara, Ashuganj, Akhaura and Chandpur in the district of Tippera and in Chaumuhani in the district of Noakhali.

Sugarcane.—24,000 cuttings of improved varieties were distributed throughout the division. Owing, however, to the severe drought germination has been very poor. The matured area, however, will form a nucleus for further work.

IV. *Introduction of new crops—Potato.*—Potatoes are a new crop in this division. They have been grown here for the last three years, and the progress is slow.

V. *Improvement in agricultural practices.*—Single seedling transplantation has been demonstrated in Feni and Noakhali, and the result has been satisfactory. It will be necessary, however, to continue the work for a few years. Owing to double-cropping and consequently late sowings a larger number of seedlings are required than where single-cropping is practised.

The Planet Junior hand hoe had been used by well-to-do farmers in potato and garden cultivation, but the high price stands in the way of the raiyats being able to use it.

The Meston plough has not proved very popular, as raiyats consider that it is too heavy for ordinary bullocks, though its efficacy has been recognised.

Chain pumps were used for demonstration purposes in irrigating potatoes, but the price is too high for the slender means of the cultivator.

Staff.—The divisional staff consists of 1 Superintendent and 10 demonstrators. The want of a District Agricultural Officer is being keenly felt.

DWIJA DAS DUTTA,

Superintendent of Agriculture, Chittagong Division.

ANNUAL REPORT OF THE FIBRE EXPERT FOR THE YEAR 1915-16.

I HELD charge of the Fibre Expert section throughout the year under review. I have also been in charge of the office of the Economic Botanist (who is on furlough) since 4th May 1916.

TOURS (164 days were spent on tour).

To Northern Bengal and Bihar.—July, September and November 1915, January, March and May 1916.

To Narainganj.—July, August and November 1915, February, May and June 1916, to carry out baling tests in connection with the investigation into Heart Damage.

To Chinsura, Calcutta, Bowreah, Haripal, etc.—August, October and November 1915, and April 1916.

To Gafargaon, Kaoraid, Mymensingh, Sarisabari, etc.—July, September, November and December 1915, and March 1916.

To Rajshahi.—July and October 1915, January, March and May 1916.

To Chandpur, Akhaura, Chattelpara, Bhairab, Chaumuhani, etc.—January, February and May 1916.

The above tours were, excepting when other reasons are given, made to inspect, or to arrange for, jute test plots.

To Rangiya (Kamrup).—August, September and December 1915, and March 1916, to advise Messrs. Birkmyre Brothers in regard to jute and other fibre cultivation.

To Cox's Bazar and Chittagong Coast.—December 1915: Commencement of investigation in connection with cocoanut palm.

To Pusa and Dalsingh Serai (Bihar).—February and May 1916, to attend Board of Agriculture and to make arrangements for production of jute seed.

To Lyallpur.—May 1916, to discuss the Punjab departmental programme for experimental cultivation of fibres.

Manures for Jute on Acid Red Soils.

Central Mirpur plots, Dacca Farm.—In the report for the year 1914-15, it was shewn that, as a result of the application of slaked lime and phosphates to the red soil of the Madhupur jungle tract, an increased net return of Rs. 29 per acre per annum was realized in three successive years.

Last season, 1916, the above results were abundantly confirmed not only on the Dacca Farm, but also in demonstration on cultivators' plots in the neighbourhood. A new series of plots in Central Mirpur field was laid down for investigation, in collaboration with the Deputy Director of Agriculture, East Bengal, of the effect of green manure, with and without lime, on the yield of jute. The plots in this series which grew jute in 1916 incidentally gave a very striking demonstration of the effect of lime and phosphates on jute, as the following figures shew:—

Number of plot.	40 lbs. nitrogen per acre as castor cake. 30 mds. slaked lime per acre. 3 mds. bonemeal per acre.				Number of plot.	40 mds. nitrogen per acre as castor cake. No lime. No bone.			
	KHARIF CROP—JUTE.		RABI CROP—MUSTARD.			KHARIF CROP—JUTE.		RABI CROP—MUSTARD.	
	Yield per plot of 1-6 acre.	Yield per acre.	Yield of grain per plot.	Yield per acre.		Yield per plot of 1-6 acre.	Yield per acre.	Yield per plot.	Yield per acre.
	M. S. C.	M. S. C.	M. S. C.	M. S. C.		M. S. C.	M. S. C.	M. S. C.	M. S. C.
7	1 5 12	6 34 8	0 8 8	1 11 0	8	0 9 8	1 7 0	0 0 4	0 1 8
9	3 30 12	22 24 8	0 9 0	1 14 0	10	2 7 12	13 6 8	0 0 4	0 1 8
11	2 35 10	17 13 12	0 10 8	1 23 0	12	2 9 8	13 17 0	0 0 8	0 3 0
Averages	2 24 0	15 24 at Rs. 8 per md.	0 9 5	1 16 0 at Rs. 5 per md.	Averages	1 22 4	9 10 3 Rs. 74 at Rs. 8 per md.	0 0 6 ...	0 2 0 As. 4 at Rs. 5 per md.
Value of crops reaped per acre.	...	Rs. 124	...	Rs. 7.	Value of crops reaped per acre.	...	...		
Total values	...	...	Rs. 131		Total values	...	...	Rs. 74-4	

	Rs.
Cost of lime applied at annas 10 per maund	19
Cost of bone at Rs. 3 per maund	9
Total cost of lime and bone ...	28
Therefore return on limed plots	103 per acre.
,, ,, unlimed plots	74 ,,
Increased net return on limed plots	29 per acre.

The lime was applied from one month to six weeks before sowing, and the bone and castor cake from one to two weeks before sowing. The castor cake is a general manure, like cowdung, and was only substituted for the latter because, being finely ground, it was easy to spread it evenly on the land: cake was equally applied to all the plots, both limed and unlimed. Numbers of cultivators who have taken an interest in this work thought at first that the lime and bone could be used in substitution for, rather than in addition to, cowdung or castor cake. This is not the case, and it is most important to realize that the effect of the lime and bone is partly dependent on the action of the general manure and *vice versâ*; in fact the various manures mutually reinforce each other.

The above table shews that the average yield of jute from limed and phosphated land was 15½ maunds per acre as against 9¼ maunds per acre from similar land which had not received lime or phosphate. The margin of yield in favour of the lime is therefore 6¼ maunds per acre in this case, which is decidedly better than the 4 maunds per acre margin, obtained from the East Shooti field experiments, detailed in last year's report. In the Rabi season, which was unfavourable, the unlimed plots practically failed to yield any mustard, but the limed area produced a crop averaging about 1½ maunds per acre. This, of course, was all clear profit.

Demonstrations on cultivators' land with lime and bone as manures for jute.—It was mentioned in last year's report that lime and bone had been applied to several plots of cultivators' land near the Dacca Farm as a demonstration of their capacity to profitably increase the yield of jute on soils of the type in question. The average increased yield of jute on three of these demonstration areas was 5¾ maunds per acre and, in the rabi season, about 1½ maunds per acre of pulse, til or mustard; these results agree with those obtained in the farm experiments. That they were a convincing demonstration to the cultivators is shewn by the fact that over forty men living in the neighbourhood of the plots have, in the present season, bought lime and bone through their local co-operative banks for application to land which is now growing jute. Good crops will be reaped in spite of unfavourable weather conditions.

Application of potash.—In connection with an investigation into the action of wood ashes as a manure for jute it was mentioned in last year's report that a series of plots had been laid out with this object in view and that carbonates of soda and potash, which are prominent constituents of wood ash, had been respectively applied to some of the plots. There were six plots in this series and all of them received—

Castor cake at the rate of 40 lbs. nitrogen per acre.					
Slaked lime	...	...	...	...	21½ cwts.
Rock phosphate	...	...	...	...	3¾ ,,

Two of them received no further treatment: but two others received, in addition, sodium carbonate at the rate of 500 lbs. per acre and the remaining two, the same quantity of carbonate of potash. The resulting crop was an extraordinary one in every respect as the following mean figures for the duplicate plots shew :—

Plot No.	Manures applied.	Yield. Per acre. Md.	s.
(*a*)	Nitrogen, lime and phosphate as detailed above ...	27	35
(*b*)	Ditto *plus* sodium carbonate	29	31
(*c*)	Ditto *plus* potash carbonate	33	28

As would be expected, the crops giving such yields were all very good but those which had received potash stood out even here, not so much perhaps on account of greatly superior height, but because of the markedly greater thickness of the stems of the plants, deeper green colour and generally healthier appearance of the crop.

The care which the cultivator, especially in the red soil tracts, exercises in preserving all household ash is thus amply explained; but wood ash on an average only contains about 5 per cent. of potash and is therefore poor in this constituent. The ash of some water weeds such as Pana and Water Hyacinth has, as will be shewn later, a potash content approaching 30 per cent.; but this is not available in any large quantity in the red soil tracts. Pure carbonate of potash is out of the question on account of expense,

and so it was decided in the present season to investigate the neutral salts of potash, viz., the chloride and the sulphate : these manures have been included in the complex series of plots designed to compare the relative merits of Water Hyacinth and Pana—each in the rotted condition and in the form of ash respectively—with the different salts of potash, including the carbonate, chloride and sulphate. The series also includes sodium carbonate alone and mixed with carbonate of potash. The crop has not yet been cut, but the appearance of the various plots is a uniform testimony to the value of potash for jute on red soils ; moreover, it is practically certain that in conjunction with lime the neutral salts of potash, such as the chloride and sulphate, are capable of producing as valuable results as the alkaline salts like carbonate of potash. As the former can be purchased at a reasonable price, there remains very little doubt that, in the application of potash, there lies the possibility of a further considerable increase in the yield of jute on red soil tracts, over and above that increase which has already shewn to be due to the effect of lime.

Water weeds.—The rapid growth of the Water Hyacinth (*Eichornia crassipes*) in the khals and bheels in the neighbourhood of Narainganj and the consequent danger of the blocking of waterways, which are important channels of traffic, was mentioned in last year's report and has received considerable attention in the year under review. Pana Gach (*Pistia stratioides*) has also been included in the investigation. Chemical analyses of the Hyacinth plant shewed that in the fresh state it contains over 96 per cent. of water, less than 3 per cent. of organic matter, containing 0·4 per cent. of nitrogen and less than 1 per cent. of ash, of which 0·2 per cent. was potash. The water content is, as was to be expected, very high, and it is on this account desirable to avoid any scheme which would involve cartage of the plant in the fresh condition : but when drying or rotting, which also, of course, involves the loss of a considerable amount of water, has taken place, the residue becomes a very valuable manure, twice as rich in nitrogen and about five times as rich in potash as ordinary farm yard manure. If the drying be succeeded by burning, the nitrogen is lost; but the residual ash contains about 45 per cent. of potassium chloride, in addition to about 4 per cent. of phosphoric acid, being about as rich in potash as Kelp. In this state the ash is probably worth several rupees a maund as a source of potash, and although about 100 maunds of original plant, would have to be dried and burnt to obtain one maund of the ash, it is within reason to suppose that people living on the banks of khals or small rivers, which are choked by the weed, would find it worth their while, in the cold weather, to collect and dry, or burn, the weed, for the ash of which there would always be a ready sale

In order to test the manurial value of the Hyacinth a scheme was drawn out in collaboration with the Deputy Director of Agriculture, East Bengal, involving the use of about 8 acres of plots. During the early cold weather of 1915 a large quantity of Hyacinth—about 1,000 maunds in all was collected at the Dacca Farm, through help kindly given by Mr. Hart, Collector of Dacca, and the Dacca Municipality. Half of the weed was placed in a heap to rot and the other half was spread out, dried and burnt, the ash being carefully collected and analysed. During the rotting process a large quantity of liquid was squeezed out of the heap and lost : that this loss is serious was proved by the smallness of the residue after the completion of the process. In future it is hoped to prevent this loss either by preliminary drying of the weed, or by absorption of the liquid in layers of earth interposed in the heap.

In the field trials 70 plots are being used, of which some are intended to compare rotted Hyacinth or Pana Gach with equivalent quantities of nitrogen in the form of cowdung or castor cake : other plots have received Hyacinth ash and are in turn compared with plots which have received equivalent quantities of pure potash salts. The results are a very conclusive demonstration of the manurial value of the Hyacinth not only in the rotted condition but in the form of ash. Moreover, the check plots shew that the chief agent in producing these good results is the potash which the plant contains in such large quantities. This is entirely in accordance with the extraordinary results, already discussed, which were obtained last year from the application of potash to jute.

It has now been decided to transfer the field experimental work with water weeds from Dacca to the tract which is seriously affected by the weed, and members of the Narainganj Chamber of Commerce have already made offers of land with this object in view. In this way and by other means

now under discussion it seems that it may be possible in the near future to make an effort on a considerable scale to check or control the spread of Water Hyacinth: otherwise it will soon menace navigation in the numberless small waterways of South-Eastern Bengal which, during the monsoon at any rate, more or less completely replace every other means of communication.

Selection and distribution of improved jute seed (Corchorus capsularis).—During the year under review about 150 maunds (12,000 lbs., sufficient to sow 1,500 acres) of pure line jute seed have been sold and arrangements have been made for the production, this year, of about 350 maunds (28,000 lbs., sufficient to sow 3,500 acres) of the seed of Kakya Bombai No. 7. A special grant of money has been made by Government for this purpose, and it is estimated that there will be no difficulty in selling the above quantity for next season's crop. The demand for the seed is steadily increasing, and there is now no room for reasonable doubt that it is capable of yielding heavier crops than the local jutes in many districts. It would appear from our experience of Kakya No. 7 on the poor soil of the Dacca Farm that four bales (20 maunds) per acre would be quite a normal crop; that five bales (25 maunds) may be confidently reckoned on if the conditions are at all good; that 6 bales (30 maunds) per acre is well within the bounds of possibility and that, under exceptional circumstances, 7 bales (35 maunds) per acre may be obtained. At Dacca, last year, the average yield over more than three acres of plots was 5 bales (25 maunds) of fibre per acre, and the mean returns from respective sets, of duplicate plots were 27 maunds, 29 maunds and 34 maunds of dry fibre per acre. These latter plots were specially treated of course, but even so, and if the Dacca soil were much richer than it is, it is safe to say that such crops could only be hoped for from a race which is a very heavy yielder indeed, and one whose seed we may, with confidence, multiply for distribution on a large scale to cultivators. Nevertheless the search for better races continues: it was mentioned in last year's report that some 700 plots had been sown at Dacca with seed collected in the districts as having the best local reputation. Several of the races thus brought under notice shewed promise, either as possible heavy yielders, or as very quick growers, and they are being investigated carefully in the present year.

Corchorus olitorius.—A number of pure lines of this variety are under investigation at Rajshahi and at Chinsura, and some shew considerable promise. As a result of multiplication in the present season there should be enough, to sow about 20 acres next year, and in the season 1918 it is hoped that it may be possible to commence the distribution of the seed of *C. olitorius* on a large scale.

Production of seed on a large scale.—The question of producing a sufficient quantity of seed at a reasonable price contains some points of interest. It is worth noting in the first place that jute and hemp offer greater difficulties in this respect than any other crop. In the case of cotton, for instance, the lint is always obtained with the seed; with flax a certain proportion of seed is always obtainable and the same refers, in a greater degree, to grain crops, where the seed is the object of selection as well as the means of propagation. With jute and hemp the plant, as a fibre producer, is ready to cut before even the seed pods have formed, and by the time the seed is ripe, it is impossible to extract good fibre from the plant. Again, it is a well-known fact that, on the whole, a dry climate produces not only a heavier yield but better seed than a wet climate. If there is heavy rain at the time of flowering, pollination cannot take place so freely, and many flowers do not result in seed; there is thus a diminished yield of the latter. It is recognized that heavy rain at flowering time diminishes the yield of rice, and the same refers to jute seed. In the damp climate of Eastern Bengal, three maunds an acre may be taken as something like an average yield of jute seed: in Western Bengal about 5 maunds might be expected, while in Bihar from 8 to 10 maunds per acre have been reaped from blocks of several acres. It is obvious, therefore, that seed can ordinarily be produced in Bihar at a cheaper rate than in Bengal. Moreover, the germination capacity of seed grown in a dry climate is often better than that produced in a moist one, for a day's heavy rain about the middle of October, or a little later, when seed is ripening in the pod, will reduce its germination capacity very seriously indeed. If a dry climate is suitable for the production of seed, a damp one, such as that of Eastern Bengal, is equally fitted for the development of the heavy mass of vegetable matter which is required in a crop of jute grown for fibre. Therefore, at a time when there is none too much jute, and bearing the above facts in mind, it is a matter for consideration whether, if a very large

quantity of seed is required, it should not be produced in other tracts than the jute districts of Bengal.

For the present it has been decided that it will be better and cheaper, instead of establishing seed farms in Bengal, to produce the immediate requirements of the department in regard to jute seed in Bihar by private arrangement with planters and others. This scheme is not intended to compete with cultivators in the jute tracts, who make a practice of producing seed for sale: the object will be rather to encourage these latter by supplying them with our pure line seed and thus converting them into agents for its distribution.

Co-operation of Calcutta jute firms in district field work.—" . . . . It is worth while for the jute trade to consider how far it can help, through its mufassal agencies, ... the practical application of its results (*i.e.*, the results of the work of the department on jute) within a reasonable time will depend largely on the number and enthusiasm of those who are engaged in the work. It would seem that mufassal agencies of jute firms could render peculiarly valuable assistance in this direction. . . . . ." The above passage occurs in my annual report for the year 1913-14. In the cold weather of 1914 Messrs. Sinclair Murray & Co., through Mr. John Luke, offered a block of 7 bighas of land at their Narainganj agency and arrangements were made to sow the land in the following season (1915-16) with the seed of Kakya No. 7. The soil of the field was not uniformly good; but an average yield of about 27 maunds (5½ bales) per acre of fibre was realized. The crop was inspected by a large number of people, and Mr. Luke has sold 15 maunds of seed this season (sufficient to sow about 150 acres) to cultivators living in his immediate neighbourhood. This practical demonstration confirms our view that the jute trade through its mufassal agencies is capable of giving more powerful help to the Agricultural Department in the matter of demonstration of improvements than any other means at present at our command. The reasons are numerous; firstly, because there are always at the agencies responsible men who are not only able, but willing, to give that constant supervision without which, for various reasons, failure comes only too often; secondly, the jute agencies are centres to which large numbers of people come from far and near; most of these people are directly connected, not only with the commercial side, but with the actual cultivation of jute, and many are themselves men of considerable influence. A further important point is that the prestige of an old established firm is lent to the field work carried out under such auspices. Mr. Suttie of Messrs. Sinclair Murray & Co., and Mr. Ross Smith of Messrs. Bird & Co., attended the Inter-provincial Jute Conference held at Calcutta in August 1915, and the above points were brought forward in the course of discussion. The result has been that over twenty plots of land near mufassal jute agencies, in all parts of the jute districts, have been placed at the disposal of the Agricultural Department in the present season, and Messrs. Suttie and Kinmond Luke (Messrs Landale and Clark, Ltd.) have spent a great deal of time and trouble in making satisfactory arrangements in regard to land, labour, etc. Managers at the respective agencies have also, without exception, taken up the scheme with enthusiasm; the various agricultural operations have been satisfactorily carried out, the plots carry good crops, and valuable results are bound to accrue.

The plots are distributed as follows:—

Name of place.	Messrs. Sinclair Murray & Co.	Messrs. Landale and Clark, Ltd.
Narainganj	2	1
Mymensingh	1	1
Sarisabari	1	1
Sirajganj	1	1
Rajshahi	...	1
Saidpur	1	...
Darwani	1	...
Jalpaiguri	1	...
Haldibari	...	1
Chattelpara	...	1
Niklidampara	1	1
Akhaura	1	...
Ashuganj	1	...
Chaumuhani	1	...
Chandpur	2	...
Madaripur	...	1

In addition, Mr. Ducat of Messrs. Bird & Co. has a large plot of about 7 bighas at Narainganj, and the Fort Gloster Jute Mill (Messrs. Kettlewell Bullen & Co.) has also a plot at Bowreah, near Calcutta. The actual alignment of the plots, and also decisions regarding the application of manure, are in the hands of the Agricultural Department, which advises the Managers through the Fibre Expert and the Deputy Directors and their respective staffs of divisional superintendents and the district officers. A departmental demonstrator is also posted at each agency where there are plots; his duty is to assist the Manager in supervising the cultivation and reaping of the crop. Arrangements regarding labour, cultivation, etc., are in the hands of the agencies; thus the whole scheme is one of collaboration, and it is difficult to overestimate the value of the work which it will be possible to do.

Help from co-operative societies.—It has already been mentioned that forty cultivators near the Dacca Farm bought bone and lime for the current season's jute crop through the local co-operative bank. The cultivators had been convinced of the soundness of the practice in question, not only by inspection of experimental plots on the Dacca Farm, but by means of demonstration plots on their own, or on their neighbour's land. It is doubtful, however, if any of them could have found the necessary money for the purchase of lime and bone; so that, without the aid of the co-operative bank, the putting into practice, by the cultivator, of knowledge gained by him from the Agricultural Department would probably have been postponed indefinitely. This is a typical instance. The problem of inducing the cultivator to take up new implements and manures differs from that of seed in that the former involves a considerable greater outlay of ready money; and for the development of this side of its work the Agricultural Department must depend, to a large extent, on the help of the co-operative credit societies. The question of seed is comparatively simple: it costs very little and the cultivator is in the habit of buying it when necessary; the use of the co-operative society in this connection is not so evident, but there is little doubt that when the organization of the supply of large quantities of seed has to be done, the co-operative movement will be able to render invaluable help.

Capital value of improvements.—It may be of interest to some to know what enormous aggregate sums are involved in even a small improvement in the great staple crops. In the case of jute, for instance, it is estimated that if the departmental seed were universally grown in the jute tracts, there would be an increased average yield of about 1½ maunds per acre—say 9 lakhs of bales— per annum; also that an equal increment could be credited to other known possible improvements. An increased annual outturn of something like 20 lakhs of bales, worth 9 crores of rupees, say £6,000,000, due simply to improved agricultural practice, is therefore obtainable, apart altogether from any increase due to extension of the area under jute.

I have pleasure in acknowledging the work done during the past year by Mr. N. C. Basu, M. Sc., Laboratory Assistant on my staff Babu Tara Nath Ray, Field Assistant, has also done good work.

ROBERT S. FINLOW, B.Sc., F.I.C.,

Fibre Expert, Government of Bengal, Dacca.

DACCA,
The 31st July 1916.

OFFICE OF THE AGRICULTURAL CHEMIST TO THE GOVERNMENT OF BENGAL.

Brief report of work done by the Agricultural Chemist to the Government of Bengal, Dacca, for the year ending 30th June 1916.

1. *Charge of Office.*—The Agricultural Chemist held charge of the office throughout the year.

2. *Staff.*—There have been no changes in the staff during the year under report.

It consists of:—

Mr. Gostabehari Pal, M. Sc. ...	...	1st Assistant.
Babu Indubhusan Chatterjee, L. Ag.	...	2nd „
Mr. S. N. Bose	...	Bacteriological Assistant.

The last two were confirmed in their appointments during the year, the 1st Assistant having been confirmed in the previous year.

Mr. S. N. Bose was deputed to Pusa in January 1916 for 2 years' training under the Imperial Bacteriologist.

3. *Leave.*—The Agricultural Chemist has taken no leave in the year under report.

4. *Tours.*—In all the Agricultural Chemist was on tour for 111 days during the year, excluding 8 days spent in the Volunteer Camp.

The following tours were undertaken:—

July 1915—To Calcutta to make arrangements regarding the appointment of a Bacteriological Assistant and to visit the Cossipur Sugar Factory. With the Deputy Director of Agriculture a visit was paid to the Chinsurah Government Farm to inspect our joint sugarcane experiments.

Also in company with the Deputy Director of Agriculture a visit was paid to Haripal to inspect a private farm at Panisehola. Samples of soil from the farm were analysed and suggestions for the laying out of certain plots were made.

August, 1st to 5th—To Calcutta to attend the Inter-Provincial Jute Conference, to which I acted as Secretary.

October, 3rd to 9th—To Burdwan in company with the Economic Botanist to examine a so-called disease of paddy. We agreed that the trouble was really drought. The Burdwan farm was also visited.

To Chinsurah to inspect the cane plots in the Government Farm and to see how the drains around the plots were acting.

To Rajshahi to inspect the sugarcane experiments on the Government Farm.

To Kushtia in order to obtain information from Messrs. Renwick and Company about the distribution of their sugarcane mills in Bengal and also to inspect cultivators' cane in the vicinity.

October, 17th to 25th—To Kotchandpur, Jessore district, in order to unpack sugar-making machinery received from the United States of America.

November, 20th to 30th—To Kotchandpur to commence experiments on the Palm Sugar Industry. A camp laboratory was established, and the 2nd Assistant, Babu Indubhusan Chatterjee, was put in charge of it during my absence.

December, 3rd to 11th—To Kotchandpur to personally help with the Palm Sugar Work.

December, 14th to 23rd—To Kotchandpur to continue palm sugar work. To Chinsurah to inspect sugarcane experiments at the Government Farm.

January, 5th to 14th—To Kotchandpur to continue palm sugar work.

January, 22nd to 29th—To attend the Volunteer Camp at Dacca.

February, 1st to 21st—To Kotchandpur to continue palm sugar work. The 1st Assistant, Mr. Pal, accompanied me and remained there till the conclusion of the work on 21st February 1916.

To Pusa, as one of the delegates representing Bengal at the Board of Agriculture.

March, 8th to 10th—To Goalunda to visit the Co-operative Palm Sugar Factory at Lakshikole and also the molasses boiling factories at Pachooria.

March, 19th to 28th—To Nagpur to examine the students of the Nagpur Agricultural College.

April, 14th to 19th—To Kotchandpur and Tarpur Sugar-Works in connection with experiments on refining date *gur* by means of centrifugal machines.

To Calcutta to interview the Director of the Chilian Nitrate Propaganda Committee and the Agent for Government Consignments.

May, 29th to June, 4th—To Joydebpur to visit Bhowal Estates.

5. *Work performed.*—The installation of Mansfield's oil gas was completed during the first few weeks of the year and has proved of great advantage.

A.—SUGARCANE.

The work under this head may be divided as follows :—

1. *The trial of promising varieties.*—The local cane grown around Dacca is known as Dacca *gandari* and is entirely used for chewing. We have always grown this in our experiments in order to compare our canes with it. There has always been a fairly large demand for cuttings of this variety which the farm has done its best to comply with.

Barbadoes 208—Was referred to in last year's report as being an excellent chewing cane unappreciated, however, by the cultivator. We are now able to state that the cultivators are making a fairly strong demand for cuttings of this variety.

Barbadoes 147—Has up till last season been found to be an exceedingly good cane for *gur* production on the Dacca Farm, and we have been able to recommend it with confidence. There are signs, however, that it is deteriorating, and the indications are that a change of "Seed" is desirable since all the cane on this farm has been grown from cane brought on to the farm some six years ago by Mr. Meggitt, the late Agricultural Chemist.

In the season 1915-16 five cane varieties were grown on $\frac{1}{10}$th acre plots for purposes of comparison. Each plot was duplicated

There was such a great demand for cuttings from cultivators for seed that it was considered advisable not to make *gur* from the whole of the cane.

Each plot was sampled for analysis by the method described in my Bulletin on "Experimental Error in Field Trials with sugarcane, etc.," Bulletin No. 49 of the Agricultural Research Institute, Pusa, by the 200 cane per plot method except in the case of Sareiha, when a larger number of canes were cut for analysis. The following tables set out the results obtained :—

SEE TABLE I.

The figures given in the column headed "Total *gur* per acre" have been obtained by multiplying the yield of *gur* obtained from each particular sample by the total number of canes in an acre and dividing the product by the number of canes in each particular sample. Hence too great reliance should not be placed on their value. They are given for what they are worth.

Appended are the results of analyses of the juice of the above samples of cane.

SEE TABLE II.

The juice analyses show that all the cane was unripe when cut, since the glucose ratio is very high in all canes. Since most of the cane was being kept for cuttings, the unripe state of the canes when harvested was of little importance.

As previously found on this farm, Yellow Tanna contains much less sugar in its juice than other canes grown on the farm. At the same time it is a very hardy cane, withstanding attacks of jackals and other pests, and for this reason it has been distributed where the demand for such a cane exists.

B 208 is again seen to have the richest juice of any of the canes, though its sugar content is not so high as in previous years. It is seen to be considerably higher in sugar content than Dacca *gandari* and the sweetness of this cane is being appreciated by the cultivator as already mentioned.

B 147 is also a rich cane, though like B 208 its sugar content has fallen off since the previous year.

Saretha cane grew very luxuriantly and also promises to give a heavy ratoon crop. At the same time it was badly attacked by Cane smut (*Ustilago sacchari*). It is worth while noting that Saretha cane flowered very freely on our plots. Flowering is sometimes said to affect the sugar content and to judge of this analyses were made on the same day of the juice of a number of canes with and without flowers.

	Sucrose gms. per 100 gms.	Reducing sugar gms. per 100 gms.	Total sugar gms. per 100 gms.
Flowering cane ...	12·70	1·24	13·94
Non-flowering cane ...	12·40	1·89	14·29

The total sugar content of these samples is so nearly the same that one would not be warranted in saying from the results that the flowering affected the sugar content.

Season 1916-17.—This season duplicate 1-10th acre plots of the following varieties have been put down on the Dacca farm.

1. Dacca Gandari.
2. Yellow Tanna.
3. B 208.
4. B 147.
5. Saretha.
6. Red Mauritius—The growth of this cane is spreading rapidly in South India.
7. Sonnabilli—A Bombay cane seed of which, however, was obtained from Mr. Clouston, Deputy Director of Agriculture, Nagpur, Central Provinces. We had tried this cane last year on a small scale, and it gave very promising results and also its ratoons are growing very well
8. Java 247—This is one of the two canes in chief use in Java, and we thought from experience of its growth in other places that it should do well in Bengal.

These plots were sown in the last week of February following a nice fall of rain. Unfortunately a long spell of drought set in shortly afterwards and the canes sprouted very badly indeed.

Red Mauritius cane has practically failed on both plots.

B 147 and *gandari* are both poor.

B 208 has some fine plants on each plot, but the plots are bare in many places

Yellow Tanna and Saretha promise fair yields, but both Sonnabilli and Java 247 are doing very well indeed and promise to do very well at Dacca.

In the season 1915-16 we also tried at Dacca small areas of Red Mauritius, B 3412, Java 36 and Java 33A canes. They all did very poorly. Java 33 A is the cane which is said to be meeting with such success in the United Provinces.

Collection and Examination of Bengal Varieties.—We now have at Dacca specimens of practically every variety of cane grown in Bengal.

The collection was started in 1914-15 with 16 varieties of cane collected mainly from the Dacca Division. Twelve of these canes were again grown in 1915-16, and these were analysed when harvested early this year.

The samples consisting of about 200 canes in each case were taken as described in my Bulletin already referred to. See Table III.

The varieties are given (in the table) in the order of their total sugar content of their juice. None of them seem to be particularly rich, but it must be remembered that all our cane varieties gave much lower sugar contents than usual at Dacca this year. Dhalia cane had the richest juice of the series. It might be mentioned that I have analysed Kazli canes in Jessore district, which contained up to 20 per cent. sucrose in its juice.

The canes referred to above are now being grown for a third season at Dacca.

In 1915-16 besides the above varieties we also obtained and grew some 40 other Bengal varieties.

For the present season, 1916-17, greater efforts have been made to obtain as complete a collection as possible. The canes have this year been sown in plots arranged according to their district of origin.

We have—

(1) Twelve varieties now in their third season on the farm.
(2) Thirty-six varieties now in their second season.
(3) Six varieties, which are being grown this year for the first time at Dacca.

The land at Dacca is not suited to experimental work with cane, and it is hoped that more suitable land will be shortly available.

Cane water-shoots.—Occasionally in cane fields one sees a particularly swollen watery-looking cane. In order to see if these water-shoots are poor in sugar, two young ones were cut in a field of Dacca *gandari*, two mature water-shoots and two normal canes were cut at the same time.

One cane of each variety was analysed the same day and the remaining canes on the following day.

The following results were obtained :—

Cane.	Length.	Weight.	Percentage of juice to cane.	Specific gravity.	Sucrose.	Juice. Reducing Sugar.	Total sugar.
	Inches.	Ozs.			Per cent.	Per cent.	Per cent.
Young water-shoot—							
First day ...	31	36	69·6	1·072	14·79	0·90	15·69
Second day ...	33	41	73·3	1·071	14·43	1·22	15·65
Mature water-shoot—							
First day ...	62	75	70·8	1·066	14·33	1·10	15·43
Second day ...	60	66	70·0	1·075	15·76	2·00	17·76
Normal cane—							
First day ...	100	65	71·1	1·080	19·04	1·40	20·44
Second day ...	80	61	73·3	1·079	17·53	1·47	19·00

These results would show that the water-shoots, especially when young contain much less sugar in their juice than normal canes, though the amount of juice is about the same in each case.

Chinsurah Farm.—Some work on cane has been carried out at this farm in collaboration with Mr. Smith, Deputy Director of Agriculture, West Bengal. This season the cane is being mainly grown as a source of seed, and the work will be described in the farm annual report.

Palm Sugar Work.—Work done under this head is being published separately, and only a brief outline will here be described. This work occupied the greater part of the time of my assistants and self during the period December, January and February.

1. *Gur-making experiments.*—A plant was imported from the United States of America, such as is used there in the Maple Sugar Industry. The advantages of this plant are supposed to be economy in fuel and rapidity in dealing with large quantities of juice. Our idea was to find a plant which would be cheap and economical of fuel and which could be worked by a number of cultivators on a co-operative basis. The results of our tests were not such as would justify us in recommending the plant, but when it was working at its best its evaporating capacity was very high and the fuel consumption quite low. We hope to be able to try it at some future time against the Hadi plant. On a co-operative basis there should be an opening for some such plant run in connection with centrifugals for refining the *gur* produced. We at times made 3½ maunds of *gur* in nine hours with our maple sugarplant.

2. *Fuel experiments.*—We carried out large number of tests to find out the amount of fuel used by the cultivator in making 1 maund of palm *gur*. He uses earthenware pans on his furnaces, which consist simply of holes in the ground with no underdraught. He usually has one, two or four pans on each furnace, and we have seen as many as 16.

We also carried out fuel experiments with a shallow pan (iron) substituted for earthen pans. Further, we used an iron pan in conjunction with a furnace fitted with fire-bars and a chimney in order to give efficient underdraught.

We have found, as a result of a large number of experiments, the following average figures for fuel consumption in the various methods of boiling tried.

The figures given relate to wood fuel experiments only.

Method of boiling.	Ratio fuel, juice.	Ratio fuel, gur.	Juice dealt with per hour.	Number of experiments.
Country systems, 1 pan ...	1·23	9·8	20	21
Ditto, 2 pans ...	0·96	8·6	40	13
Ditto, 4 „ ...	0·87	6·4	83	5
Iron pan country furnace ...	0·93	7·95	70	2
Ditto with fire-bars and chimney.	0·57	5·00	102	5
Maple sugar outfit	0·66	5·99	128	9

There would thus seem to be room for considerable economy in fuel by modifying the local furnaces. It is proposed to take up work in this direction. Shallow iron pans with an efficient type of furnace seem indicated, as only 5 maunds of wood were used in this type of boiling plant to produce 1 maund of *gur*, whereas the best country method required 6·4 maunds of wood per maund of *gur*.

An iron pan, moreover, seems to produce a *gur* of slightly brighter colour.

3. *Juice Collection.*—Numbers of experiments were carried out to determine the best way of preserving the juice as it falls from the trees. The Bengal tapper's only means of doing this is to smoke the inside of the pots in which they catch the juice as it falls from the tree. We have found this practice to be of distinct value. At the same time it is quite inefficient as a means of preserving the juice which falls from the tree during the day time when the temperature is high. In consequence practically the whole of the day juice is wasted We have found that this day juice represents 20 per cent. of the total flow of juice yielded by the trees in 24 hours. Further, this day juice if properly preserved is much richer in sugar than the night juice. Hence if it could be used for sugar production it would be a great advantage. We tried numerous experiments to preserve this juice. Formalin was fairly useful for this purpose. The most efficient means we found, however, was to smear the inside of the pots with a lime cream. The juice then keeps almost perfectly. We made high quality *gur* from day juice (called *ola* juice) collected in pots treated with lime. The cultivators had not previously seen good crystalline *gur* produced from day juice Moreover, the night juice odtained is of much better quality when the pots are so limed. Liming is the universal practice in the palm sugar districts of Madras.

It is proposed to start demonstration next cold weather with the idea of popularising liming.

Some experiments were also carried out in which metal buckets were used as a means of collecting the juice. For some reason not clear to us the juice so collected was of poorer quality than that collected in earthen pots.

4. *Refining the gur.*—This is a very important industry in certain parts of the palm sugar districts. It is, however, carried on in a primitive manner. The *gur* is allowod to drain in baskets, and water weed is put on the surface of the *gur*. After some days a layer of fairly white sugar is removed from the surface of the basket. The process is fully described in my memoir on "The Date Sugar Industry in Bengal, etc.," Chemical Series, Vol. II, No. VI. of the Department of Agriculture, Pusa. The process is lengthy and wasteful of sugar. Accordingly we think it would pay in view of the importance of the industry to do the refining by means of centrifugal machines. We were told, however, that sugar could not be produced in this way from palm sugar. Through the courtesy of the Tarpur Sugar Works some tests were carried out on refining palm *gur* in this way. They were perfectly successful, and the

samples prepared in this way elicited praise from the owners of some of the sugar refiners. The striking point, however, was that *gur* made from juice which had been collected in limed pots gave a far higher outturn of sugar than ordinary *gur*. Moreover, it had a much better colour.

5. *The cause of the colour of date gur.*—Date *gur* is a much blacker product than cane *gur*, and this fact no doubt affects its popularity to some extent. The cause of this colour was unknown. We have investigated the cause of this colour with success. In addition to cane sugar, the palm juice contains small amounts of the sugars, glucose and lævulose. We have shown the juice to contain appreciable quantities of Potassium Bicarbonate. As the juice is concentrated, this alkaline substance acts on the glucose and lævulose and produces dark coloured bodies which are the cause of the dark colour of the *gur*. By slightly acidifying the juice or just neutralising it with any acid lovely golden coloured *gur* can be produced. We used numerous acid products, such as sulphuric, hydrochloric, and citric acids, alum, lemon juice, tamarind fruit extract, and so on. All were successful except hydrochloric acid, which, for a well known chemical reason, does not give such good results if the juice is actually acidified with it.

6. *Other sugar-producing palms.*—It is proposed to pay some attention to the sugar-producing possibilities of a small stemless palm (*P œnyx acaulis*) which grows in profusion in the Madhupur jungles. Some seeds have been planted on the Dacca Farm.

Miscellaneous investigations.—(*a*) *A sugar in jute seeds.*—A sugar has been shown to occur in jute seed to the extent of about 2 per cent. It has been identified as glucose.

(*b*) *Work on soil acidity.*—Work has been commenced with a view to studying the changes in the reaction of the Dacca soil when dressed with lime in increasing proportions.

(*c*) Some attention has been paid to a change discovered in limed palm juice by which cane sugar is converted into a dextro-rotatory gum.

Routine work.—Considerable time has been devoted to testing various analytical methods and in instructing the assistants in those methods.

A number of samples of soils, oil cakes, sugars have been analysed during the year. Some analyses of various plant ashes were carried out for the Fibre Expert, Bengal.

Two samples of beet-root grown in Darjeeling were sent for a report in their sugar content. Both were exceedingly poor in sugar.

Some bone charcoal and boiler flue ash were also examined on behalf of factories in order to see if they possessed any manurial value.

H. E. ANNETT,

Agricultural Chemist, Govt. of Bengal, Dacca.

TABLE I.

Variety.	Number of canes in sample.	Weight of canes.	Weight per cane.	Weight of juice.	Percentage of juice to cane.	Weight of *gur*.	Total number of canes on both duplicate plots.	Total *gur* per acre, 1 md. = 80 lbs.
		lbs.	lbs.	lbs.				Mds. s.
B 208 ... Plot I	187	564	3·0	404	71·6	63	4,808	90 0
„ II	175	442	2·53	304	68·3	47		
B 147 ... Plot I	152	320	2·1	216	67·5	82	2,691	87 20
„ II	162	490	3·0	370	75·5			
Yellow *Tanna*—Plot I	147	721	4·9	522	72·4	98	2,046	99 30
„ II	109	400	3·7	270	67·5			
Dacca *gandari*—Plot I	187	496	2·65	364	73·4	99	2,688	99 37
„ II	149	368	2·47	374	74·4			
Saretha	1,836	...	...	830	...	118	20,982	85 0

TABLE II.

Variety.	Specific gravity, 70° F.	Sucrose per cent. gms per 100 gms.	Reducing sugar per cent. gms. per 100 gms.	Total sugar gms. per 100 gms.	Glucose ratio.
B 208 ... Plot I ...	1·075	15·34	1·64	16·98	9·7
,, II ...	1·069	13·48	1·98	15·46	12·8
B 147 ... Plot I ...	1·068	12·53	3·01	15·54	19·4
,, II ...	1·067	12·56	2·81	15·37	18·3
Yellow *Tanna*— Plot I ...	1·058	9·69	2·40	12·09	19·8
,, II ...	1·063	11·26	2 66	13·92	19·1
Dacca *gandari*— Plot I ...	1·065	10·40	3·73	14·13	26·4
,, II ...	1·064	10·92	3·53	14·45	24·4
Saretha	1·066	11·90	2·45	14·35	17

TABLE III.

Variety.	Average weight per cane.	Percentage of juice extracted.	Sucrose in juice per cent.	Reducing sugar in juice.	Total sugar in juice.	Specific gravity of of juice.
	lbs.					
Dhalia ...	2·13	64·0	12 94	3·12	16·06	1,064
Samsara ...	2 32	68·6	12·23	3·26	15·49	1,063
Red Khagri ...	1·25	58·5	12·18	3·38	15·56	1,063
Kazli ...	1·79	55·0	11·45	3·76	15·21	1,060
Dhali (Faridpur)	2·18	61·2	10·73	3·76	14·43	1,056
Khagri ...	1·20	61·4	10·69	3·57	14·26	1,060
White Bombay ...	1·10	69·1	10·78	3 33	14·11	1,058
Hemza ...	2·09	63·7	10·00	4·00	14·00	1,055
Bombay ...	3·67	67·0	10·12	3·33	13·45	1,054
Khagri ...	1·32	56·0	8·79	4·27	13·06	1,056
Black Khalia ...	1·25	52·6	8·21	4·46	12·67	1,052
White Khagri ...	1·05	61·4	6·54	5·68	12·22	1,052
Khela (Faridpur)	1·45	52·4	7·76	4·16	11·92	1,046
Khelia ...	1·20	50·0	5·91	5·43	11·43	1,048
Do. ...	1·10	56·5	6·20	4·67	10·87	1,048

THE REPORT OF THE ECONOMIC BOTANIST, BENGAL, DACCA, FOR THE YEAR ENDING 30th JUNE 1916.

The Economic Botanist remained in charge of the section for 11 months till 3rd May 1916, when he went on leave. Mr. Finlow, Fibre Expert, took over charge of the section. There were no changes or additions to the staff of the section.

Tours.—The Economic Botanist was on tour for 67 days, and visited the following places:—Chinsura, Burdwan, Rajshahi, Rangpur farms in Bengal and the Karimganj farm in Sylhet (paddy work); Mymensingh and Chittagong districts (paddy); Comilla and Noakhali districts and the Vikrampur subdivision of Dacca (*Ufra* disease).

The Assistant to the Economic Botanist was on tour for 21 days, visiting the Garo Hills and Chittagong Hill Tracts with the Assistant to the Imperial Cotton Specialist, to assist the latter in studying the varieties of cotton and methods of cultivation there. The Preparer was on tour for nine days, doing paddy work at Chinsurah, and the second Fieldman for three days, collecting paddy seeds.

Work.—The following are the main items of work carried on during the year:—

(*a*) *Rice: Study and testing of varieties.*—The work on rice was continued on the lines explained in previous years' reports. This work now

monopolises about the whole time of the staff of the section. To recapitulate, the work is divided into three main sections—

(1) The growing of varieties in small pure-line plots for studying varietal character, including yielding capacity.
(2) Cross-fertilisation experiments to study the inheritance of important differentiating characters.
(3) Testing on a field scale, on the farms and in the district, varieties selected as a result of No. 1.

This last item is carried on in conjunction with the Deputy Director of Agriculture.

During the past season items 1 and 2 involved the growing of some 1,500 plots, about 1,000 of which were for the purpose of studying varieties, while the remainder were for the object of studying the inheritance of characters on crossing. The most interesting part of the work is perhaps item No. 2, as a result of which about a dozen characters have so far been found to be inherited on Mendelian lines, most being simple, but some complex. The results of some of this work have been sent for publication as a Botanical memoir during the past season.

As a result of the selection work, very encouraging results have again been obtained from the variety *Indrasail* (Rangpur No. 7). 21 acres of this pure line were grown on the Dacca Farm during season 1915-16 and yielded at the average rate of 33½ maunds (2,748 lbs.) per acre, in one ravine, 2½ acres in size, the yield reaching 42 maunds (3,456 lbs.) an acre. The same variety was also tested on 50 demonstration plots in Dacca and 50 in Mymensingh district against the common local varieties, and gave equally successful results. In Dacca district the average yield of the plots was about 34 maunds (2,788 lbs.) an acre, giving an average increase of about 8 maunds (656 lbs.) an acre over the cultivators' varieties, and in Mymensingh the results were almost as good. As a result of last year's demonstration work a big demand has arisen for this seed, and over 600 cultivators will be growing it this season in the neighbourhood of the Dacca Farm and in Mymensingh district. The same variety was also tested during the past year at Rangpur, Rajshahi and Chinsurah farms and at Karimganj in Sylhet and surpassed the local varieties in all places. In addition to the paddy work at Dacca, work on similar lines has been started at Chinsurah, and selection work at the Karimganj Farm in Sylhet is being conducted under the advice and supervision of this office.

(*b*) *Specific gravity selection of* Aus *paddy.*—This was continued for the third year on the same lines as in the two previous seasons. The results, as regards the advantage of heavy seed, were again indefinite, but again clearly in favour of lower seed rates than ordinarily in use. 17 seers and 7 chittacks (36 lbs.) of seed sown on 23¼ cottahs of land (*i.e.*, 1 bigha 3¼ cottahs), which is the common local seed rate, yielded 9 maunds 6 seers (about 750 lbs.) of grain, while the same quantity of seed spread over double the area (46½ cottahs or 2 bighas 6½ cottahs) yielded 18 maunds 23 seers (1,523 lbs.).

(*c*) *Ufra disease.*—The experiments to find some means of checking *Ufra* were continued. An area (1 acre) at Chaumuhani in Noakhali district was again for the third time burned and thoroughly ploughed and selected seed sown in various rotations—

(1) *Aus* followed by transplanted *Aman.*
(2) *Aus* and long-stemmed *Aman* mixed (the local practice).
(3) Long-stemmed *Aman* only.
(4) Jute followed by transplanted *Aman.*

No disease appeared this year on any of the plots.

The object of the experiment is (1) to determine whether such remedial measures produce any effect in diminishing attacks of *ufra*, (2) what rotations on these areas suffer least and are most remunerative. The results so far appear to prove that (1) the remedial measures do have the effect of diminishing *ufra*, and (2) that, wherever possible, on such lands it is better to grow *Aus* or jute followed by transplanted *Aman* rather than *Aus* mixed with broadcast *Aman.*

At Bikrampur another area (7 acres), on which a similar experiment was conducted the two previous seasons, was this year left to the owner to cultivate in the usual way and was kept under observation only.

The owner burned the stubble on 1 acre and removed the stubble from the rest of the area. No *ufra* appeared, but the crop was badly destroyed by floods.

Further experiments on similar lines on a larger scale have also been started by the Collectors of Dacca, Noakhali and Tippera under the guidance of this department.

At Laksam a collection of deep-water *Aman* was again grown with the object of selecting early ripening varieties for further testing. Four varieties of *Digha* were selected as being specially early, and some of these are being tested this year in Dacca subdivision. It is hoped these varieties may escape *ufra* by their ripening before the attack becomes virulent. The Imperial Mycologist's experiments at Comilla were also continued.

The Mycological Collector completed a survey of the infected tracts in the Dacca district.

Other Crops.—The collection of *matikalai* varieties (*Phaseolus mungo*), Sesamums, Brassicas and Capsicums were again grown and further observations made. Four varieties of *matikalai* were handed over to the farm for further trial.

Fruit.—Work in the fruit area was mostly of a routine order. The figs put down in 1914 are not likely to prove a success. The rainy season is too wet for them. Pruning of the gauvas and custard-apples was done, and the drainage of the area was considerably improved by the digging of longitudinal drains between and parallel to the rows of trees. The mangoes promise well, but the mango weevil has already appeared in such fruits as have been so far obtained.

Entomology and Mycology.—The Entomological and Mycological Collectors continued to work under the Economic Botanist. Separate reports are submitted of their work.

G. P. HECTOR,

Economic Botanist, Bengal.

Memorandum of Insect-pests reported from Bengal during the agricultural year 1915-16.

1. Letter dated 3rd August 1915 from C. W. Caston, Esq., Calcutta, sending for identification specimens of an insect which was damaging grape-vines. The insect proved to be an example of *Teratodes monticollis*. A practical method to check this insect was suggested, but it was also pointed out that there might be another insect responsible for the damage.

2. Letter dated 25th August 1915 from the Principal, Bengal Veterinary College, Belgachia, reporting that the leaves of young mahogany trees planted in the college compound were attacked by a disease. The affected leaves were examined, and the damage was found to be caused by a leaf-miner (*Acrocercops cramerella*—Snell). Suitable remedial measures to check its future attacks were suggested.

3. Letter dated 27th August 1915 from the Manager, Margaret's Hope Tea Co., Ld., forwarding specimens of guava twigs and fruits damaged by insects for examination and suggestion of remedial measures. The fruits were found to be attacked by *Dichocrocis punctiferalis*, and for the control of this pest some practical methods were recommended.

4. Letter dated 19th December 1915 from Mrs. Annie Drake, Serampore, sending an insect for identification, the cocoon of which she found suspended from a castor-plant. The insect was determined to be a Braconid parasite.

PUSA,

The 12th July 1916.

T. BAINBRIDGE FLETCHER,

Imperial Entomolgist.

No. 120, dated Pusa, the 24th July 1916.

From—DR. E. J. BUTLER, M.B., F.L.S., Imperial Mycologist, Agricultural Research Institute, Pusa,

To—The Director of Agriculture, Bengal.

I HAVE the honour to submit a report on the work done by this section for the Province ot Bengal during the year ending 30th June 1916, as requested in your letter No. 2928-29, dated the 9th May 1916.

Ufra disease of rice.—This continues to be the chief Bengal investigation in progress. Experiments were instituted at Comilla and Pusa to test methods of checking the disease, but the experimental area at Comilla was found by the local department to be difficult to supervise and was consequently abandoned. At Pusa evidence was obtained that the disease can be completely checked by thoroughly burning the stubble during the period when the land is fallow, but it has proved possible to carry the worm over this period in an active condition by supplying it with contantly renewed young paddy to feed on. Normally the parasite survives from one season to the next in a dormant condition in the dry stubble. It is now a question of working out on a field scale the best practical methods of cleaning the stubble off the fields, or otherwise destroying it soon after the harvest of the grain. For testing this, experiments are in progress in collaboration with the local department.

The laboratory work at Pusa has proved conclusively that *ufra* is due solely to the attack of the minute worm *Tylenchus angustus*, described in Pusa Bulletin No. 34 (1913), and has yielded much information regarding its habits and biology. It has been found, for instance, that the parasite is unable to move about in the plant and reach the parts on which alone it can feed, unless the atmosphere is very moist around the plant. Also that it cannot long survive complete immersion in water, and is therefore semi-aquatic, not aquatic as at first believed. Still it can live in water for some weeks and passes readily from plant to plant by swimming, being able to move both with and against the stream. It seems to be definitely restricted to paddy as a food plant, and has so far defied cultivation on anything else.

None of the points still under investigation are likely to modify seriously the method of treatment advocated in the past. The removal or destruction of the stubble in broad-casted paddy fields should, if done thoroughly and on a large scale, save the subsequent crop from serious damage. There are various methods of doing this, and these should be put into practice as extensively as possible at an early date.

Sâl disease.—At the request of the Forest Department, Bengal, the section undertook the investigation of a disease of *sâl* trees in the forests of the Buxa-Duars. The disease proved to be a sort of root-rot in which the tissues of the trunk immediately below the ground level become destroyed and eventually present an appearance very similar to that which is well known under the name "partridge wood." Associated with this condition of the wood a polyporus fructification is very often found on diseased trees just above the ground level. Specimens of the fructification have been identified at Kew as *Polyporus shoreæ* wake—a species new to science. A mycelium is present in the diseased tissues, and from it a fungus has been obtained in culture which it is believed is the vegetative stage of *P. Shoreæ*. The results of inoculations on living *sâl* trees carried out at Rajahbhatkhawa have not yet been completed.

Jute.—The Fibre Expert forwarded some samples of jute seed for examination, in which the sclerotia of Rhizoctonia Solani Kühn were adhering to the seed. The fungus was obtained in culture and proved similar in all respects to that previously isolated from diseased stems of the jute plant. The exact manner in which this fungus reaches the seed is not known and will be the subject of further investigation.

Smoke injury in Mango Orchards.—The injurious effect of the fumes from brick kilns on mango trees has been recorded by this section on several occasions. A case was reported from Malda during the year. The affected garden was in the direction of the prevailing wind, a second garden on the opposite side of the kiln being undamaged. The injury is most marked when the fruit approaches maturity and shows especially in exposed fruit, those well covered by the leaves being less affected. Many of the fruits drop before they ripen, others remain but ripen prematurely and rot at the distal end. Branch and twig injury was not observed in this case, but has resulted in others previously reported from other localities. It is clear that brick kilns should not be located near mango orchards.

Betel vine.—An account of the disease of this crop in the vicinity of Bogra was included in the Memoirs, Department of Agriculture in India, Botanical Series, Vol. VII, No. 4, August 1915.

Amongst other diseases from Bengal examined during the year mention may be made of a serious attack of gram rust from Jessore, and potato disease caused by Fusarium Solani in Narayanganj, Cossimbazar and Rangpur.

Reports of a serious disease of the *wum* palm (? *Nipa fruticans*) in Chittagong Division were also received and are being enquired into.

A number of plates illustrating certain diseases of crops common in Bengal were presented for the use of the Bengal Department.

Babu Kali Prasanna Roy, a student from Bengal, attended for a course of training in Mycology from 10th August 1915 to 31st May 1916.

ENTOMOLOGICAL REPORT FOR THE YEAR ENDING 30th JUNE 1916.

DURING the year I spent 87 days on tour and visited the following places:—

July—Baliani (*Baraset*).—To investigate the Rice Leaf Roller (Cnaphalocrocis medinalis) and Rice Hispa (Hispa aenescens).

Naihati.—To investigate the Jute Semilooper (Cosmophila sabulifera) and demonstrate remedial measures.

Jhenida, Kaliganj, Kotchandpur.—To investigate Rice Hispa and demonstrate remedial measures.

August—Suri.—To investigate Rice Swarming Caterpillar (Spodoptera mauritia) and suggest remedies.

Diamond Harbour.—To investigate Rice Hispa and demonstrate remedial measures.

September—Ghatal (*Midnapore*).—To investigate Rice Hispa.

Murarai (*Birbhum*).—To investigate a paddy disease

Bararchar (*Dacca*).—To investigate Ufra disease of paddy and Rice Stem-borer (Schoenobius bipunctifer).

October—Routhbhog (*Dacca*).—To investigate Dak (Ufra) disease of paddy and Rice Stem-borer.

Burdwan.—To investigate the Rice Gall Fly (Cecidomyia oryzae).

November—Muchharchar (*Narainganj*)—To investigate Army Worm of rice (Leucania unipuncta).

Kaorid (*Dacca*).—To investigate a cauliflower pest (Opatrum sp.) and to spray the affected crop with lead chromate.

Atgaon (*Kishorganj*).—To investigate Army Worm of rice (Leucania unipuncta).

Bankura.—To investigate a wheat pest and suggest remedial measures.

December—Comilla.—To investigate the greasy surface Caterpillar (Agrotis ypsilon) on mustard and Army Worm of rice, and suggest remedial measures.

January—Narainganj.—To investigate greasy surface Caterpillar on potato and spray the crop with lead chromate.

Naogaon.—To spray ganja with vermisapon for Red Spider.

Narainganj.—To investigate the potato root disease (Rhizoctonia).

February—Narainganj.—To investigate the potato root disease (Rhizoctonia) with the Mycological Collector.

March—Kurmitola (*Dacca*).—To supervise Ufra experimental work.

April—Gaibandha.—To investigate the Cocoanut Budrot and Palm Beetle (Oryctes rhinoceros) and suggest remedies.

Kurmitola.—To supervise Ufra work.

Chandpur.—To investigate Indigo Caterpillar (Caradrina exigua) on jute and suggest remedies.

Kurmitola.—To supervise Ufra work.

May—Jamalpur.—To investigate the Large Brown Cricket (Brachytrypes achatinus) on jute and suggest remedies.

Madhyapara, Madhurchar, Chandina, Munshiganj (*Dacca*).—To investigate the Rice Hispa and demonstrate remedial measures.

Rangpur.—To spray jute attacked by Indigo Caterpillar (Caradrina exigua).

June—Adiabad (*Narainganj*).—To investigate jute pest and suggest remedial measures.

The chief items of work are noted below:—

Bhapu disease of paddy.—The investigation was continued and it was found to be due to the attack of the Rice Gall Fly (C. oryzae). A short note on the life history of the pest has been submitted to the Imperial Entomologist.

A suspected paddy disease.—The investigation was continued with Mycological Collector, but as there were no typical cases in the year under report no definite conclusion has yet been arrived at.

Mango Shoot-borer (Alcides frenatus).—The life history has been studied and a note has been written for publication as a leaflet.

The Red Spider on ganja.—Spraying with vermisapon was continued.

Mango Weevil.—Investigation of the pest and trial of remedial measures were continued.

Jute pests.—The pests were specially investigated and short notes on them have been written for publication as a pamphlet.

Observation and treatment of the crop pests on the Dacca Farm.—The more important insects observed are the following :—

Bihar Hairy Caterpillar (Diacrisia obliqua—Loc. "Bichhapoka").
Red Spider (Tetranychus sp.).
Rice Case Worm (Nymphula depunctalis).
Twelve Spotted Epilachna (Epilachna dodecostigma).
Mango Shoot-borer (Alcides frenatus).
Jute Semilooper (Cosmophila sabulifera—Loc. "Chhat poka").
Rice Stem-borer (Schoenobius bipunctifer—Loc. "Majra poka").
Large Brown Cricket (Brachytrypes achatinus—Loc. "Urchoonga").
Mothborer (Chilosp—Loc. "Majra").
Rice Earcutting Caterpillar (L. unipuncta—Loc. "Chhenipoka").
Mustard Aphis (Aphis brassicae—Loc. "Jab poka").
Mustard Saw Fly (Athalia proxima).
Tobacco Caterpillar (Prodenia littoralis).
The Litchi Mite (Eriophyes sp.).
Mango Hopper (Idiocerus sp.).
Grain Moth Caterpillar (Sitotroga cerealella).
Indigo Caterpillar (Caradrina exigua).

Fumigation, spraying, handpicking, etc., were resorted to to check the ravages of the above insects, where possible.

Parcels.—A number of specimens of insects were received. They were identified and their life histories were explained and practical remedial methods were suggested.

Publication.—The Mango Shoot-borer (Alcides frenatus, Fst.).

(Submitted to the Economic Botanist, Bengal.)

P. C. SEN,
Entomological Collector.

MYCOLOGICAL REPORT FOR THE YEAR ENDING THE 30TH JUNE 1916.

I WAS on privilege leave for one month and 22 days: I spent 145 days on tour during the year and visited the following places :—

Birbhum and Burdwan—To investigate suspected paddy disease and suggest remedial measures.
Chinsura and Munshiganj—To investigate Wilt disease of Banana.
Rangpur and Narainganj—To investigate potato blight and suggest remedial measures.
Mymensingh—To investigate Ufra disease of paddy.
Malda—To investigate mango disease.
Noakhali, Tippera, Vikrampur and Bhowal—To supervise Ufra experiments.

Most of my time was spent in supervising the Ufra experiments started in different places and also in surveying the Ufra-infected tracts of Dacca district. The object of this survey was to obtain (1) accurate information as to the exact area of country over which the disease occurs, in order to see whether it shows any tendency to spread, and if so, in what direction, (2) to gather other information as to the varieties of paddy grown and the methods of cultivation on the infected areas.

My report on the survey has been submitted to the Imperial Mycologist, through the Economic Botanist, Bengal. The amount of damage done by Ufra in one portion of the Dacca district alone is calculated at Rs. 2 lakhs per annum. The disease is gradually spreading.

In addition to the work on Ufra, the following diseases were also investigated during the year under review :—

Sclerotium and *Phyllosticia* of paddy; *Rhizoctonia* and *Collectorichum* of Betel vine, *Frusarium*, *Rhizoctonia* and *Collectorichum* of potato; *Ustilago* of sugarcane, and other minor diseases.

Specimens received in the laboratory were also identified, reports written and remedial measure suggested.

AMRITA LAL SOM,

Mycological Collector.

OFFICE OF THE DEPUTY DIRECTOR OF FISHERIES, BENGAL.

No. 838, dated Calcutta, the 19th July 1916.

From—T. SOUTHWELL, ESQ., A.R.C.S., F.Z.S., Deputy Director of Fisheries, Bengal and Bihar and Orissa,

To—The Director of Agriculture, Bengal.

IN reply to your letter No. 2930-31, dated the 9th May 1916, I have the honour to submit herewith a report on the work undertaken by the Department during the year ended 30th June 1916.

As usual, this report summarises the work attempted both in Bengal and Bihar and Orissa.

Under the Directors of Agriculture, I was in charge of the Department throughout the year, and was assisted by Mr. B. Das, M.A., and Mr. S. M. Mohsin, Superintendents of Fisheries. The temporary appointment of Zoological Assistant was held throughout the year by Babu Surendra Nath Ghosh. The question of confirming this officer in his appointment has been considered by Government. He will be confirmed and placed in Class I of the Subordinate Agricultural Service on passing a Zoological Examination equivalent to that of the Medical College.

The Deputy Director of Fisheries joined the Department on 5th December 1911. The agreement drawn up by the Secretary of State was for two years in the first place, extendable to four years. This agreement expired on 5th December 1915. In September 1915 representations were made by the two local Governments to the Secretary of State, through the Government of India, for confirming the present Deputy Director in his appointment. Pending a reply from the Secretary of State the Deputy Director carried on the work from December to the end of June under the orders of the local Government. The unsettled future of the Department, and of the Deputy Director in particular, during the year under review, has seriously interfered with the work of the Department, as I deemed it inadvisable to incur expenditure on hatcheries until I was certain that they could be utilised when constructed. I was also unable to take over the administration of certain fisheries, and the work suffered in other ways.

Tours.—I was away from Calcutta on tour for 116 days.

Fishery surveys were made at Bandel, Serampore, Mankundu, Ranaghat (Churni river), Naihati, Siliguri, Shamnagar, Amta, Tarkeswar, Raniganj, Burdwan (Damodar river), Sasaram (canals), Sambalpur, Gaya and Purulia.

Work in the launch was confined to the Khulna area, which was visited several times, particularly during the Hilsa season. The Attarabanka and Bhairab rivers were carefully investigated. During the Hilsa operations conducted by Mr. Mohsin at Buxar, I visited this station on three occasions. I visited Cuttack four times, partly to supervise the work done there by Mr. Das on Carp and Hilsa, partly to arrange details regarding the erection of fish pass over the Mahanadi, and partly to initiate propaganda work amongst the fishermen with the object of forming a Co-operative Fishery Society. I visited Ranchi on two occasions; once to discuss general fishery matters with the Director of Agriculture, and again to discuss certain proposed fishery regulations with the Hon'ble Mr. F. Clayton, Secretary to the Government of Bihar and Orissa, Public Works Department (Irrigation, Marine and Railway Branches). I visited Jangipur, Berhampore and Krishnagar (the latter on two occasions) in order to initiate Co-operative Credit Societies amongst fishermen. Twice I went to Arrah to arrange details with the Superintending Engineer relating to the proposed carp tanks at Delabagh. On two occasions I visited Puri in order to make observations on the breeding habits of Pomfrets and Mullets. Investigations were made at Amta and Bankipore with reference to the occurrence of Carp eggs and fry. I visited Dacca in order to enquire (1) what improvements are possible in the pearl-button industry, (2) whether free schools could be established amongst the poorer fishermen, (3) to enquire into the desirability of fixing a central fish market.

During February I attended the meeting of the Board of Agriculture at Pusa, and in December last, at the request of the Director of Fisheries, Punjab, I inspected the fishery operations which are being conducted by the Punjab Government.

Reports on my investigations at every place named have been sent to the Director of Agriculture of each Province, as have also the reports of the two Superintendents of Fisheries.

Babu Surendra Nath Ghosh, the Zoological Assistant, was on tour for 200 days. He visited Amta, Champadanga, Hooghly, Chinsurah, Chandernagore and Serampore in connection with the work of carp-fry distribution.

General fishery surveys were made by him at Bandel, Kustea, Midnapore, Khargpur, Uluberia, Purulia, Bankipore and Puri.

He enquired into the relations existing between the fishermen and zemindars at Bhagalpur, Monghyr and Champanagar. He conducted fishery enquiries in the launch between Khulna and Barisal, stopping at the following fishery centres :—Khulna, Jhalakati, Alaipur, Manickdah, Fathgate, Tarkeswar, Kowkhali and Barisal. He assisted in the Hilsa investigations at Cuttack, Kujong, Buxar and Goalundo. He attended the Agricultural Exhibitions and had charge of the fishery exhibits at Khagra (Purneah), Sambalpur and Banjetia (Murshidabad). He was deputed for one month to work under the Registrar of Co-operative Societies, Bengal, in order to prepare himself for undertaking the establishment of societies amongst fishermen, where, and when, such a course seems desirable. During this period, and subsequently, he visited the following places purely in connection with co-operative work :—Jangipur, Pabna, Dacca; Chandina, Munshiganj, Pura (Dacca district); Khelar, Arun, Khagra, Bhadrakali, Dhitpur, Markandachak, Ilaspur, Kesherpur, Simulia, Monoharpur, Hariharpur, Mughberia, Bajarpur, Baruipur and Sankarpur (Midnapore district); Brahmanberia, Golkar and Gokaran (Tippera district).

On a report made by Babu Surendra Nath Ghosh to the effect that Carp bred regularly in a *bundh* at Jogardanga, near Garbetta (Midnapore district), we instituted enquiries which ultimately established the truth of his report, as a result of which we have been able to collect most valuable information regarding the breeding habits of Carp, certain details of which are given later in this report,

During July and August Babu Surendra Nath had, practically, entire charge of the work of distributing carp fry throughout both Provinces, which he carried out in a satisfactory manner. Under my guidance he published a report, in Bengali, on the "Carp fry Industry in Bengal," and he also assisted me in the preparation of maps illustrating the report on "Fishery rights in Bengal and Bihar and Orissa."

Publications.—During the year under consideration the following papers have been prepared and published :—

1. "Certain facts relating to the fisheries in Bengal and Bihar and Orissa," published in the Agricultural Journal of the Department of Agriculture, Bihar and Orissa. Vol. III, No. 1, April 1915. (Was not available until October 1915.)

2. A Bengali translation of a paper on "Some local industries dependent on aquatic animals," published as Departmental Record No. 4.

3. "On some Indian Cestoda," Part II, published in the records of the Indian Museum, Vol. XII, Part I, No. 2, February 1916.

4. Statistics of fish imported into Calcutta during the year ended 31st March 1916, which have been collected by the Director of Statistics in accordance with the order of the Government of Bengal, but which have been published as Bulletin No. 9 in order to continue our series, the present being the fourth in the series.

The following papers, which were in course of preparation during the preceding year, have also since been completed and published.

5. A paper describing a large number of fish-diseases published in the records of the Indian Museum, Vol. XI, Part IV, August 1915, as "Notes from the Bengal Fisheries Laboratory," No. 2.

6. A report on "Parasites from fish and aquatic birds in the Chilka Lake," published in the records of the Indian Museum, Vol. XI, Part IV, August 1915, as "Notes from the Bengal Fisheries Laboratory," No. 3.

7. A report dealing with the fishery rights in the estuaries and rivers of both Provinces; illustrated with maps.

8. A report, in Bengali, of the work done by this Department during the year ended 30th June 1914, published in the "Krishi-Samachar." Translated by Mr. Das.

9. A brochure, in Bengali, on "The Carp-fry industry in Bengal," published as Departmental Record No. 3 by Babu Surendra Nath Ghosh.

Besides the above, a comprehensive work on the life-histories and habits of Carp, and other common edible fish in Bengal, such as Sal, Sol, Mango fish and Bhekti, etc., has been commenced.

Laboratory work.—Unfortunately, owing to pressure of other work, it has not been found possible to devote much time to research. This is the more disappointing on account of the fact that the real development of the fisheries of this Province depends almost wholly on scientific research. The department (whose operations extend over two Provinces) is lamentably understaffed. Whilst we are fully aware of the lines on which progress could be made, we were unable to do justice even to most important aspects of our work. Thus, although we have been fortunate in working out fully and accurately the life-histories of Indian Carp, and also of *Notopterus chitala*, the series of embryonic forms deposited in the Fisheries Laboratory in the Indian Museum, still awaits description. During the year before us we propose making a special feature of research work, as we consider this essential. The actual investigations undertaken are summarised in the publications Nos. 3, 5 and 6 noted above and need not be detailed here. In addition, the nature of various diseases prevalent amongst marketable fish was determined for certain Municipal Health Officers.

Propaganda work.—As usual, propaganda work has been continued vigorously on the lines adopted in previous years. We have ample proof that our endeavours have been far from fruitless. It is clearly desirable that we should seek to get into intimate touch with the actual fishermen, for only by so doing can we hope to achieve the best results.

Agricultural Exhibitions.—The Department attended and had exhibits at the following places :—

Banjetia (Bengal) ; Purnea, Monghyr. Khagra, Ranchi, Tirhut and Sambalpur (Bihar and Orissa).

Under orders from Director of Agriculture, Bengal, no Exhibitions were attended in Bengal, with the exception of the Banjetia Exhibition in Berhampur, where, at the special request of the Maharaja of Cossimbazar, we sent fishery exhibits. The exhibits were similar to those of the preceding years and everywhere aroused the interest of the public.

Hilsa culture.—We had one Hilsa station at Cuttack and another at Buxar. Mr. Das was in charge of the former and Mr. Mohsin of the latter. I fixed on Cuttack because the anicut over the Mahanadi prevents Hilsa from migrating further up the river. The fish collect at the foot of the anicut and fishermen are plentiful. We thus had a plentiful supply of fish. The first Hilsa was obtained on 15th June. The eggs measured ·08 mm. Hilsa increased in numbers as the season advanced, and the eggs increased in size. On 28th October the eggs measured 1·02 mm. in diameter, and the fish were evidently ripening. The day following, the authorities of the Public Works Department found it necessary, for the safety of the anicut, to close the sluices, thus diverting the main current into the Biropa river. The Hilsa disappeared at once. Messrs. Das and Ghosh then followed the fish down to Kujong (50 miles), but on their arrival were unable to obtain fishermen to catch fish. On the 29th November a consignment of Hilsa caught near the mouth of the Mahanadi was examined and found to be spent. It seems clear that some success would have been achieved could our investigations at Cuttack have continued. As it was, we were compelled to cease operations at the critical moment. I consulted the Superintending Engineer with a view to keeping the sluices open a little longer, and I am satisfied that, had it been possible, this would have been done.

At Buxar no results of any kind were obtained. Usually, hundreds of Hilsa are available daily at this place, but during the year under review the Hilsa season at Buxar was a failure. The total number of fish examined by Mr. Mohsin during July, August, September and October amounted only to 252. It will be remembered that three years ago no ripe Hilsa were obtainable at Monghyr. Mr. Mohsin was of opinion that at Buxar, which is about 140 miles higher up the river, ripe Hilsa would be available. As we have seen, the result was disappointing. At Khulna, Babu Surendra Nath Ghosh examined 185 Hilsa in early October. Of these, 119 were immature females, and 18 were partly mature females. Of 48 males, one was fully mature, 13 partly mature, and 34 immature. In addition, Babu Surendra Nath examined numbers of Hilsa at Goalundo. none of which were ripe. I confined my investigation to the Attarabanka and Bhairab rivers in the Khulna district. The work was conducted in the launch. Whereas in other parts of the Province, Hilsa are caught one at a time, (by means of Sangla *jals*), in the Khulna district huge nets are used. As a result I had the opportunity of

examining large numbers of Hilsa continuously until the season was entirely over. Although mature Hilsa (both male and female) have been repeatedly found, we have never yet been able to obtain mature specimens of both sexes at the same time. All the evidence points to the probability of Hilsa breeding during their actual ascent up the rivers. No one has yet seen them breeding. It is useless to fix hatcheries on shore merely because Hilsa are abundant at that particular place. Apparently what is necessary is that the Hilsa have to be carefully followed up the river from, say, Goalundo, or up the Ganges, until the ripe sexes are discovered. This we are attempting to do. The elucidation of the habits, particularly the breeding habits of Hilsa is by no means a simple matter. Similar work in America, and elsewhere, has only been accomplished as a result of prolonged and careful observations by numbers of trained men. Our information regarding the habits of Hilsa is materially increasing year by year, but it is not likely that we shall be in a position to artificially cultivate this species for some time yet.

Enquiries into the habits of other fish.—The life-history and breeding habits of *Notopterus chitala*, and of other species nearly related to it, have been worked out fully. Unfortunately, up to the present we have not been able to write up the account and figure the details, but this we shall do as early as possible. As yet, we have been too fully occupied to take up direct investigations into the breeding habits, etc., of Bhekti, Topsi, etc., as these fish breed almost at the same time as Carp and certain Siluridæ, on which we have up to the present confined our observation.

Enquiries into the habits of Indian Carp.—These enquiries have been most successful. We have been fortunate in being able to discover Carp in the act of breeding. This took place in the Talbandi, at Jogardanga, near Garbetta, district Midnapore. It appears that Carp regularly breed in this *bundh*, as they also do in neighbouring *bundhs*. Breeding takes place in very shallow water (about one foot), at the very onset of the rains. We were successful in securing a fine series of embryos. In Europe, the development of Carp eggs occupies several days, depending largely on temperature. In Bengal, the eggs hatch out in about 24 hours. During enquiries which I made into the Carp fisheries in the river Damodar at Amta, Tarkeswar, Burdwan and Raniganj, last cold weather, the conclusion was arrived at that a favourite breeding place for Carp is in the beels. These beels are connected with the rivers during the rains. The place chosen by Carp comprises the shallow part of the beel which is dry land during the hot weather. During the floods, the fry are carried from the beels into the rivers. It appears certain, however, that Carp also breed in the rivers, but as yet no special breeding grounds have been located. The discoveries made with reference to the breeding habits of Carp are of the highest importance, since we are now in a position to supply large quantities of pure fry to the public. During the year, Government has sanctioned the construction of experimental carp-tanks at Delabagh on the Dehri-Arrah canal. This site was chosen because running water is available in quantity throughout the year. The estimated cost is Rs. 4,000 and the work will be completed before 31st March 1917. These tanks will resemble the natural *bundhs* in Bengal in which Carp breed naturally, and we have every reason to expect that Carp will breed in them. In addition, methods of artificially cultivating them will be studied, and, if possble, perfected. The reclamation of these beels (in progress throughout Bengal) is a serious matter because in the process, the breeding places of the principal fish of the Province are destroyed.

Now that we have determined the conditions under which Carp will breed, endeavours will be made to stimulate these conditions in other water-areas throughout the Province. Such operations seem to me to be full of promise.

Cultivation of fish in tanks and distribution of fry.—We have this year received orders for 4½ lakhs (4,50,000) of Carp-fry. These we shall distribute, for cultivation in tanks, before the end of August 1916. During the earlier part of the year, circulars were distributed throughout both Provinces advising people interested that orders for fry could be booked. The principal railways have, as usual, granted special facilities for the transit of these fry. The manner in which this industry has grown can be judged by the following figures :—

Distributed in	No. of fry.
1913	1,32,000
1914	2,09,000
1915	2,61,000
Ordered for 1916 ...	4,50,000

Up to the present, we have not been able to supply pure carp-fry. A certain percentage of predatory fish were present in nearly all the consignments hitherto sent out. As a result of our Carp investigations during the year under review, we are now in a position to supply a considerable quantity of pure carp-fry, and this quantity will increase yearly. The ultimate effect on the cultivation of fish in tanks will undoubtedly be markedly beneficial.

Marine and Estuarine Fisheries.—No opportunity occurred during the year for undertaking any marine work. A few Calcutta firms made enquiries regarding the possibility of initiating a fish-oil and manure business along the Orissa coast, and in the vicinity of the Chilka Lake. Details were discussed with the firms' respresentatives and advice given.

The investigations into the estuarine fisheries were limited again to the Khulna district. The fisheries in the Bhairab and Attarabanka rivers were specially investigated. The work dealt mainly with the beel and Hilsa fisheries, and with the possibility of establishing Co-operative Fishery Societies. Practically every fishing village between Khulna and Barisal was inspected, and the prospects of co-operative work amongst these fishermen are most promising.

Unfortunately we were not able to continue our enquiries into the Chilka Lake fisheries.

Fish Traffic.—Under orders from the Government of Bengal (letter No. 8466, dated the 28th August 1915) the work of collecting fishery statistics was relegated to the Director of Statistics. His report for the year ended 31st March 1916, has been published by this Department in order to keep our series continuous. It appears from the report in question that the total imports of fish to Calcutta *viâ* all routes amounted approximately to 2,40,143 maunds or 8,821 tons, as against the following figures for the three preceding years, which, it should be noted, *do not include fish imported* via *steamer or road.*—

	Maunds.	Tons.
1912-13	1,44,039	5,291
1913-14	98,606	3,625
1914-15	84,860	3,117
1915-16	2,40,143	8,821

Co-operative Fishery Societies.—During the year, the two Superintendents of Fisheries and the Zoological Assistant underwent a course of training under the Registrar of Co-operative Societies. Mr. Das and Mr. Ghosh were placed under the Registrar of Bengal, and Mr. Mohsin under the Registrar in Bihar and Orissa. The object was to train these officers for undertaking co-operative fishery work.

Up to the present, the following co-operative Fishery Societies have been established in Bengal, largely owing to the energy of Rai Jamini Mohan Mitra Bahadur, the Registrar of Co-operative Societies, Bengal:—

District.	Name of Society.	Date of Registration.
1. Dacca	Ashrafnagar Hindu Bank ...	9th April 1914.
2. Khulna	Raruli Dhibar Samity ...	13th May 1914.
3. Midnapore ...	Bishnupur Dhibar Jautha Bank ...	5th January 1915.
4. Howrah	Chakkashi Ramkrishna Co-operative Bank.	15th February 1916.
5. Murshidabad ...	Gajipur Haldar Rinodan Samity ...	28th ditto 1916.
6. Pabna	Nemai Charan Haldar Rinodan Samity.	5th May 1915.
7. Tippera	Gokarna Fishery Jautha Bank ...	10th June 1916.

It will thus be seen that three new societies have been inaugurated during the year. Unfortunately no fishery societies have yet been formed in Bihar and Orissa. The objects of these fishery societies were enumerated in my last report and need not be reiterated here.

Government have now arranged that this Department shall receive six months' notice before the expiry of the lease of all Government fisheries. This is helping us materially at the present time. It gives us the opportunity of preparing the fishermen for undertaking their own improvement. In this way the Department also gets in touch with the fishermen who thus understand our aims and are helping us accordingly. Two or three new and

important societies are about to be formed. Arrangements are being made with the Chairman of the Calcutta Municipality for reserving certain stalls in the market where the catches of these Co-operative Societies can be disposed of without the intervention of middlemen.

General.—During the year at the request of the Dacca pearl button merchants, steps have been taken by this Department to find market for their produce. It is to be regretted that the absence of raw material prevents these merchants extending materially the industry at present.

Local buttons are deficient in polish. With a view to remedying this defect enquiries were made in America and Japan as to methods of polishing adopted in these countries. It was found that buttons made from local shells cannot be polished as satisfactorily as buttons made from shells obtained in Japan and America, the reason being that unfortunately the local shells have an unsatisfactory colour throughout their thickness.

The Government of Assam have requested the Government of Bengal to include the Assam fisheries in the investigations of this Department. The Government of Assam offered to appoint and maintain an official on a commencing salary of about Rs. 75 per mensem, whose business it would be to learn the work and to confine his attention to the Assam fisheries. In view of the extensive area over which the Department at present work, I could not view the proposal favourably. Government concurred with this view and replied to the Assam Government to the same effect. Eventually, however, it was decided to receive and train a Deputy Collector from Assam. Up to the present the Deputy Collector has not commenced work.

The following order relating to the Bengal Fisheries has been transmitted to the Commissioners of the Burdwan, Presidency, Dacca, Rajshahi and Chittagong Divisions :—

"Six months before a Government fishery is due for resettlement the Collector should enquire from the Deputy Director whether he is prepared to manage the fishery departmentally, or to constitute a Co-operative Society of fishermen with a view to settlement being made with the Society; he should also enquire from the Deputy Director what restrictions he proposes both as to close times and as to methods of fishing. If departmental management is not found desirable, preference in settlement should be given to a Co-operative Society of fishermen, and in the absence of such a Society leases should be given to one or more selected fishermen. If for any reason this is not possible the lease should be given to one or more carefully selected persons who are not fishermen. The practice of settling Government fisheries by open and unrestricted auction should be discontinued. In every case conditions as to close times and methods of fishing should be embodied in the lease in consultation with the Deputy Director of Fisheries. Great care should also be taken in drawing up the remaining conditions of the lease which the circumstances of the individual fishery may require."

As a result of this order, the Fishery Department will fortunately be able to extend its operations, and the opportunity will thus occur of effecting such improvements as are indicated in individual cases. The Government of Bihar and Orissa are at present considering a similar proposal. During the year, a fish pass has been erected over the Mahanadi at Cuttack. We can now reasonably expect a slow but sure improvement of the fisheries in that river.

Working in conjunction with the Collector of Bankura, arrangements have been made for distributing fry, free, amongst the famine-stricken fishermen of that district. Fifty-eight fishermen applied for assistance, and in all, we expect to distribute about two lakhs of fry for cultivation in tanks. This measure of relief appears to have given satisfaction to the parties concerned

T. SOUTHWELL,

Deputy Director of Fisheries, Bengal and Bihar and Orissa.

Dated Calcutta, the 3rd July 1916.

From—B. DAS, ESQ., Superintendent of Fisheries,
To—The Deputy Director of Fisheries, Bengal.

IN compliance with your letter No. 421—23, dated the 10th April 1916, I have the honour to submit below a report of my work done during the year ending the 30th June 1916.

Introduction.—During the year under review I was mainly occupied with the following items of work—

(*a*) Artificial fertilisation and incubation of the eggs of the Indian carps (Rohu, Catla, Mrigal and Calbasu) and of the Hilsa.
(*b*) Investigation into the spawning habits of the above named Indian carps.
(*c*) Representing the Fishery Department in the Industrial and Agricultural Exhibitions.
(*d*) Survey of the condition of fisheries and fishermen with a view to introduce a system of co-operation among them.
(*e*) Receiving practical training in the methods of organizing co-operative societies.

I was out of headquarters for 265 days during the year. Of these 187 days were spent on work in connection with carps and Hilsa, 19 in attending the exhibitions, 32 in fishery survey and investigation into the condition of of the fishermen and during the remaining 27 days I was under training in Co-operative work.

(*a*) & (*b*) *Carp work.*—All our work in past years in this connection has been superseded by our discovery in the second week of June 1916 in some of the *bunds* in the districts of Midnapore and Bankura that the spawning habits of our Indian carps are very similar to those of the European carp. These *bunds* (embankments) are similar in many respects (although they are not so well constructed) to the Bohemian "Tiche" in and about Wittingau, where I was under special training for carp culture. There are any number of such *bunds* in Midnapore and Bankura. These are constructed by erecting an embankment at the lower end of a sloping country. By this means large water areas are produced by the catchment of the rain water, which is mostly used for irrigation. In some of the *bunds*, *e.g.*, Talbandi, Enreamara, Sovavat, Kadambundh etc., in Midnapore district they have put carps (Rohu, Catla and Mrigal), and the conditions are very similar to those in the spawning tanks in Wittingau. In Talbandi and Enreamara I was present when the fish were actually spawning. The spawning movements are similar to those of the European carps, but the fertilised eggs are 4 to 6 mm. in diameter; they are not sticky and do not attach themselves to water weeds, grass, etc.; they take only 24 hours to hatch out. Whereas with European carps the eggs are not more than 1·5 mm, in diameter, they are sticky, adhering themselves to water weeds, grass, etc., and they occupy 6 to 8 days or more in hatching. These observsations were made at Talbandi and Enreamara. The incubation of the eggs and the development of the embryo were studied in the temporary hatchery at Jogardanga. We have thus found out that the Rohu, Catla and Mrigal breed in still water under conditions similar to those in the spawning "Tiche" (tanks) on the Continent of Europe.

In the experiments in Cuttack during the year under review we attempted to fertilise the carp ova by taking them out of the ovary of the fish, first by opening the abdomen of the fish and then mixing the ova with the milt which could be stripped from the male. We tried the fish from the Mahanuddy as well as from several tanks in Cuttack. On account of our total dependence on the lessee of the Mahanuddy fisheries in respect of brood fish for our experiments I could not get a single ripe male from the Mahanuddy, although we were there from the 15th June. I got some females which were still full of roe, but the males were all spent. With tank fish, however, I got both the males and females apparently ripe. The mixing of the milt with ova was followed by an immediate change in appearance of the ova, but there was no development of the embryo on subsequent incubation in the hatchery. The eggs were 2 mm. in diameter and were of a greater density than water. The incubation was done in Macdonald Universal jars and also in various kinds of trays and troughs. From our recent discovery of the nature of the fertilised eggs of our carps and from subsequent microscopical examination in the laboratory it is clear that the eggs were not fertilised. We have thus not found it possible to artificially fertilise carp eggs by the method we adopted in Cuttack. With our present knowledge of the habits of the fish the best course for the culture of our carps would be to adopt, with some modifications to suit our climate, the lines of culture used in Bohemia. At the same time experiments in other directions will be useful. Preliminary arrangements for a model culture station could be commenced immediately after the rains are over under our supervision in the districts of Midnapore and Bankura, and we expect economic results as good as those

in Wittingau where the annual production of carps from the several tanks of Prince Schwazenburg amounts to 400,000 kilogrammes per year.

Hilsa work.—During the year under review I was in Cuttack for the artificial impregnation of the Hilsa ova. In previous years I visited Monghyr and Rajmehal in order to examine the sexual maturity of the fish with the result that I could not get any information about the presence of a ripe fish.

During my stay in Cuttack I observed the Hilsa coming up the anicut at Cuttack from the 30th June till the 27th October. The ova were in a very rudimentary condition in the beginning, each of them measuring 0·075 mm. in diameter. They became larger towards the end of the season, being 1·02 mm. on the 27th October. Even then they were not properly ripe as the ova were extracted with much pressure and as they did not show the development of an embryo after they were mixed with the milt of the male and incubated in the hatchery. It was clear, however, that the eggs were rapidly ripening after the first week of October. On account of the stoppage of the current of the Mahanuddy by the Public Works Department and the passing of the accumulated water above the Mahanuddy anicut through the Biropa the Hilsa became scarce. I proceeded to Kujong about 50 miles below Cuttack, but no arrangement could be made by the Sub-Manager of the Burdwan Raj to catch any fish for our work. On the 28th November I examined some Hilsa which were caught in the sea face at the mouth of the Mahanuddy, but found them fully spent.

It will be noted that the Hilsa were not spent in the Mahanuddy at Cuttack on the 27th October and that they were fully spent on the 28th November in the mouth of the same river. Although we were unable to obtain definite results this year, it is clear that in order to obtain good results with respect to Hilsa we have to carefully watch the fish in the Mahanuddy from Cuttack to the sea-face during October and November.

(*c*) *Exhibitions.*—During the year under report I attended the Agricultural Exhibitions at Purneah and Monghyr with our departmental exhibits. Lectures were delivered on carp culture with specimens of the fish in their different stages of growth and also with specimens of predatory fishes which should be avoided in carp tanks. Instructions were given for the culture of some of the predatory fishes of economic importance with their specimens as well as with the specimens of some of the miscellaneous fishes which could be used as food for the predatory fishes. Specimens of the fishes that destroy mosquito larva were exhibited, and some of them were shown in the act of destroying the larva in a small aquarium. Fishery by-products were shown, and the manufacture of buttons from the shells of common Indian mussels was explained. Fish-curing by salting and smoking was demonstrated by a model smoke-house and a salting vat.

(*d*) *Co-operative work among fishermen and fisheries.*—I visited Gobra, Manikdaha, Patgate, Kahooiboonia, Matibhanga, Nazirpur, Jhalakati, Barisal, Jangipur, Ballyghata, Gujurpur, Johordipara, Jhilakuti, Nurpur, Geriah, Dufferpur, Dhulian, Gadi, Gankor, Azimganj, Seakhala, Bongong, Gopalnugger, Barakpur, Sukpukharia, Hasnabad, Basirhat, Taki, Debhatta, Nowpara, Khauja, Barunhat and Kaliganj, in order to enquire into the condition of the local fishermen and fisheries. It appeared that the fishermen and the fisheries are greatly deteriorating largely on account of too many middlemen (*e.g* lessees, nikaris and brokers, etc.) coming in between the fishermen and the consumers. For an improvement of this situation it would be necessary to introduce a system of co-operation among the fishermen and to instruct them in the best methods of improving the fisheries.

(*e*) *Deputation for training in co-operative work.*—I was under practical training for co-operative work under the Registrar of Co-operative Societies for the month of April. I was given all facilities to learn the work in Brahmanbaria and Rampurhât subdivisions. In this connection I visited Gholkar, Gokaran, Bijeswar, Chartollah, Ashuganj, Talshahar, Shahapur, Kalisima, Chopurtollah and Guniauk in Brahmanbaria subdivision and Rampurhât, Kushmore, Rampura, Amuddya, Gosainpur, Balia and Mallarpur in Rampurhât subdivision. I studied methods of organisation under Khan Saheb Abdul Rauf and Babu Narendra Nath Dutta and the system of audit and other details under Rai Saheb Pramatha Narain Chowdhry and Babu Annada Prosad Mukherjee. I organised one new society of fishermen at Gokaran.

B. DAS,

Supdt. of Fisheries.

Dated Bihar, the 7th July 1916.

FROM—S. M. MOHSIN, ESQ., Superintendent of Fisheries,
TO—The Director of Agriculture, Bengal,
(through the Deputy Director of Fisheries, Bengal, Bihar & Orissa).

I HAVE the honour to submit a brief summary of my work done during the year ending 30th June 1916. I was on one month's privilege leave on account of ill health in November last and on medical certificate in June last. I was on tour for 209 days and visited the following places in Bengal and Bihar and Orissa—

Bengal.	*Bihar & Orissa—contd.*
Khulna.	Barh.
Goalundo.	Buxar.
Katwa.	Daltonganj.
Narainganj.	Garhwa Road.
Damra.	Jepla.
Dacca.	Bankipur.
Tangi.	Patna.
	Dinapore.
Bihar & Orissa.	Muzafferpur.
	Dumka.
Arrah.	Rajmehal.
Balasore.	Pakur.
Cuttack.	Ranchi.
Samastipur.	Nawadah.
Sitamarhi.	Dhainbad.
Raraul.	Jherriah.
Sagauli.	Katras.
Hajipur.	Gaya.
Bhagalpur.	Raghunathpur (Purulia).

During the year under report I set up two hatcheries at Cuttack and Buxar. Mr. Das was in charge of the former and I was in charge of the latter. I conducted experiments on artificial hatching of Chital (*Notopterus chitala*), carp and Hilsa eggs during the rains. Hilsa and carp were extremely scarce, and our experiments suffered greatly on that account. I have already submitted a detailed report on the subject to the Deputy Director of Fisheries. Any repetition of the proposals regarding the artificial culture of Hilsa made in my previous reports seems unnecessary.

I dragged the tanks at the Bankipur Agricultural station when conducting an experiment in breeding some of the voracious fishes. I examined the reproductive organs of the brood fish and then sold all the fishes as the tanks were required by the Deputy Director of Agriculture for the use of the farm. The results of the examination and dragging have been submitted in detail to the Deputy Director of Fisheries.

A considerable amount of propaganda work was done during the year in places which had not been visited before. The principles and benefits of tank culture were explained to the people by whom tank culture was absolutely neglected. At these places the fishermen were mustered, principles of co-operation were explained to them, their difficulties were investigated and advice given as to how they could conduct their business on improved lines. Chairmen and Vice-Chairmen of municipalities were interviewed and induced to take up fish culture in their tanks. Zamindars were also approached and the benefits of fish culture were explained to them. I also made some enquiries regarding the breeding habits of mussels near Dacca and Narainganj, but as the season was too early no "*glochidæ*" were found, and owing to other more important work I was obliged to postpone the enquiry. During my stay at Buxar I collected a number of specimens of plankton from the Ganges, some of which have been examined by the Deputy Director of Fisheries and have been found of great scientific importance. Some young mussels were also found among those specimens. I attended two Agricultural Exhibitions with fishery exhibits, viz., at Muzafferpur and Ranchi. The people appeared to take a keen interest in the fishery exhibits, and the stall was always crowded. Principles of tank culture were explained and improved European and American methods of curing, smoking and salting fish were demonstrated to the public. Pamphlets in the vernaculars dealing with those subjects were widely distributed. Some important places where the fish supply is very deficient such as Dumka,

Daltonganj, Pakur, Rajmehal, Sitamarhi, Katwa, etc., were visited and the possibilities of improving the supply were investigated. Proposals were made to the local authorities, and zamindars were pursuaded to take up fish culture in their tanks.

Preliminary enquiries were also made at several places and fishermen sounded with regard to their attitude, towards starting Co-operative Credit Societies among them. The idea was everywhere welcomed by the fishermen. Final enquiries have been made at Balasore and Cuttack, and it will not be long before we see Co-operative Societies formed there among the fishermen.

In the latter part of April I was deputed to the Co-operative Societies Department for one month to acquaint myself with the principles of co-operation and its methods of working. I was placed under the Registrar of Co-operative Societies, Bihar and Orissa. I visited many village societies, central banks, technical societies and then accompanied the Registrar to Cuttack with a view to find out the possibilities of forming a society among the fishermen there. The fishermen were most anxious to have a society formed immediately but the Registrar thought it too early to do so. The seed of co-operation was, however, sown and before long we may see a society formed there.

I also enquired into the Government fisheries in the Ganges at Dinapore, Bankipur, Patna and Barh. The local fishermen and the lessee had quarelled with the result that the fishermen had struck work. The supply of fish to the town of Bankipur had fallen off, and the lessee was working at a loss. When I took up the enquiry the dispute had already been settled, but I submitted detailed report on the causes of the trouble.

I also tried to find out the spawning grounds of the Hilsa at Khulna and Goalundo during the rains and examined the reproductive organs of the fish, but owing to the experiments at Buxar the enquiry was made over to Babu Surendra Nath Ghosh, the Zoological Assistant, who prosecuted it to the end of the season.

S. M. MOHSIN,
Supdt. of Fisheries.

ANNUAL REPORT ON SERICULTURAL OPERATIONS DURING THE YEAR ENDING 30th JUNE 1916.

THE general control and the management of the Sericultural operations in Bengal continued in the hands of the Bengal Silk Committee, consisting of the Director of Agriculture, Bengal (*President*), the Collector of Murshidabad and two representatives of Messrs. Anderson, Wright & Co., and the Hon'ble Mr. G. H. C. Ariff. During the year under review the Committee held four regular meetings (attended by visitors who are interested in the silk industry), and one special meeting attended by the Hon'ble Mr. N. D. Beatson Bell, C.S.I., C.I.E., I.C.S., and Mr. H. Maxwell-Lefroy, the Imperial Silk Specialist, as visitors.

Administration.

I remained in charge during the year.

Mr. Probhat Chandra Choudhury, Superintendent of the Berhampore Central Nursery was, in addition to his ordinary duties, also in charge of the cross-breeding experiments in the absence of Mr. E. Grangeon.

An experimental station was started at 5, Alipore Road, Calcutta, under the supervision of Miss Cleghorn.

Disinfection of village rearing-houses.

This system was introduced by the Superintendent of Sericulture, Bengal, in the year 1910 and is at present being carried on with vigour. Supervisors under the supervision of the nursery superintendents were employed to disinfect the houses of a few selected professional rearers, and all the furniture used in them with strong copper-sulphate solution and sulphur fumes. The supervisors examined their seed (moth) just in the same way as is done in the nurseries.

Copper sulphate worth Rs. 197-15-6 and sulphur worth Rs. 59-13-6 was supplied to the rearers from the Sadar godown at the cost price with necessary instructions.

As a result of this disinfection outturn obtained by the rearers was in almost every case very satisfactory.

Tours.

The Superintendent of Sericulture, Bengal, spent 335 days on tour and inspected the nurseries as often as possible. The points which especially engaged his attention were (1) the production of disease-free seed in the nurseries and in the houses, of "selected professional rearers"; (2) comparison of the results obtained from the nursery seed with those obtained from the "selected rearers," seed; (3) the disinfection of the selected rearing-houses and of the furniture used in them; (4) the extension of the area of mulberry plantation; (5) the planting of "selected" mulberry in nurseries and supplying the same to the raiyats as far as practicable; (6) the improvement of ordinary village rearing-houses by introducing ventilators and windows for light and air.

Inspection.

The Director of Agriculture, Bengal, inspected most of the nurseries twice during the year under report. The Director of Agriculture, Assam, visited the Malda and Berhampore central nurseries on one occasion. The Collector of Malda on one occasion inspected the Malda nurseries. Messrs. Goodman, Malcolm and DeMinvielle, members of the Bengal Silk Committee, inspected the Piasbari Central Nursery. Mr. Lefroy, the Imperial Silk Specialist, inspected the Piasbari, Amriti, Berhampore, Kumarpur and Chandanpur central nurseries.

The Hon'ble Mr. N. D. Beatson Bell, C.S.I., C.I.E., I.C.S., Member of the Executive Council of His Excellency the Governor of Bengal, visited a rearing village named Kumarpur on the 10th January 1916, and enquired of the rearers about the results obtained from the nursery seed as compared with those obtained from the "selected rearers," seed. The Commissioner of the Rajshahi Division and the Collector of Bogra paid visits to the Bogra Nursery. The Collector of Murshidabad inspected the Kumarpur Central Nursery in the Murshidabad district.

Present condition of the silk industry in Bengal.

The price of khongroo silk rose from Rs. 9 to Rs. 16, while green cocoons were sold up to Rs. 52 per maund. Such an increase in the price of silk has not been experienced during the last 30 years in Bengal.

Central Nurseries.

The following is a list of the central nurseries in operation during the year:—

(1) Berhampore Central Nursery, containing 7 rearing-houses and 69 bighas 4 cottahs and 10 chattaks of mulberry lands.
(2) Piasbari Central Nursery, containing 5 rearing-houses with 67 bighas 4 cottahs and 12 chattaks of mulberry lands.
(3) Amriti Central Nursery, containing 4 rearing-houses and 83 bighas 13 cottahs 7 chattaks and 3 gandas of mulberry lands.
(4) Kumarpur Central Nursery, containing 4 rearing-houses with 38 bighas 14 cottahs and 15 chattaks of mulberry lands.
(5) Chandanpur Central Nursery, containing 4 rearing-houses with 41 bighas 1 cottah and 4 chattaks of mulberry lands.
(6) Kalitha Central Nursery, containing 4 rearing-houses with 51 bighas 13 cottahs and 10 chattaks of mulberry lands.
(7) Mirganj Central Nursery, containing 6 rearing-houses with 61 bighas 16 cottahs and 8 chattaks of mulberry lands which are full of gaps and are being filled up.
(8) Bogra Nursery, containing 6 small rearing-houses with 29 bighas 15 cottahs and 12 chattaks of mulberry lands.

Of the above nurseries the one at Amriti began its first rearing from September 1915. The Berhampur Central Nursery is the only one in full working order. Funds were sanctioned for the extension of the remaining nurseries, but owing to the financial situation all construction works had to be stopped.

A systematic survey of the nurseries has been made this year, and the total area under cultivation comes to 443 bighas 4 cottahs 14 chattaks and 3 gandas. Out of this area 4 bighas 12 cottahs at Piasbari, 4 bighas 3 cottahs at Berhampur and 11 bighas at Chandanpur Central Nursery have been newly planted with "selected" mulberry at 5 feet apart. This new method of selected mulberry plantation appears to be less liable to be attacked by "Tukra," which may ruin a whole crop; it is also very convenient for interculture, and is likely to reduce the cost of cultivation. It also yields better leaves.

Interchange of seed between nurseries.

The Bogra Nursery has been started with the idea of supplying pure and healthy Chhotopoloo seed to the other nurseries of the department, while the Piasbari Central Nursery has been started in order to supply pure Nistari seed to the other central nurseries. The Mirganj Central Nursery is supplying Nistari seed to the Piasbari and Amriti central nurseries, while the Piasbari and Bogra nurseries take their seed from "selected rearers" houses.

Supply of Nistari and Chhotopoloo seed.

Seed pure and free from disease was reared in all the central nurseries and the whole outturn obtained was disposed of as seed-cocoons. This was

highly appreciated by the raiyats. Those who once purchased the nursery seed and obtained better results never hesitated to offer higher prices for nursery seed than those for which they could buy ordinary village seed in the market

The total receipts from the outturns of the nurseries from 1st July 1915 to 30th June 1916 were as shown below :—

			Rs.	A.	P.
Sale proceeds of seed-cocoons	...	...	15,432	5	7½
Ditto cocoons	...	...	743	6	6
Ditto rejected cocoons	...	...	38	0	6
Ditto mulberry leaves	...	...	434	0	0
Ditto miscellaneous articles		...	180	11	9
Total		...	16,828	8	4½

Compared with the total receipts of the last two years, it will be seen that there has been an encouraging increase of the revenue. This is due to the opening of Piasbari and Amriti central nurseries in the district of Malda.

The figures for the last three years are given below for comparison :—

		Rs.	A.	P.
1913-14	...	8,324	3	0
1914-15	...	13,069	1	9
1915-16	...	16,828	8	4½

Details of the sale proceeds of the outturn of each central nursery during the year under report are noted below :—

Name of Nursery.	Seed-cocoons.	Cocoons.	Rejected cocoons.	Mulberry leaves.	Miscellaneous articles.	Total price.
	K. P. G.	K. P. G.	K. P. G.	Rs.	Rs. A. P.	Rs. A. P.
Piasbari Central Nursery ...	2,978 15 0	19 4 0	20 0 0	...	26 14 0	5,477 2 6
Amriti ditto ...	1,399 12 0	74 12 0	19 8 0	37	41 3 9	2,583 2 6
Berhampur ditto ...	1,879 12 11	257 15 13½	38 0 0	121	27 3 3	3,349 1 9
Kalitha ditto ...	596 15 10	137 0 0	...	...	14 11 3	655 6 9
Mirganj ditto ...	1,594 11 8	447 3 0	54 8 0	..	28 4 6	2,747 12 0
Kumarpur ditto ...	621 1 17	14 12 0	11 8 0	76	17 10 0	1,032 9 4½
Chandanpur ditto ...	518 4 11	18 14 0	15 8 0	200	24 13 0	983 5 6
Total ...	9,587 8 17	969 12 13½	159 0 0	434	180 11 9	16,828 8 4½

It will be seen from the above statement that of all the central nurseries the nursery at Piasbari produced far and away the largest quantity of seed-cocoons and realised the highest value for them. The Amriti Central Nursery, working only for ten months, did very well also.

The reason for the small quantity of production of seed-cocoons at Kalitha, Kumarpur and Chandanpur central nurseries was a considerable fall in the outturn of mulberry leaves. Owing to the scarcity of rainfall throughout the year the production of mulberry was less everywhere than in the previous year in spite of manuring and irrigation. Most of the leaves went bad on account of the severe cold during the winter and excessive heat during the summer, the temperature reaching as high as 115° F. The two big crops in *Chait* and *Ashar* could not be reared, as there was no water even in the tanks to irrigate sufficiently and the mulberry was attacked by "Tukra." No rain fell till June.

For improving the condition of the mulberry plantations cowdung manure was applied. But manuring with cowdung is not possible everywhere, as it is not always available in sufficient quantities and sometimes, not at all.

The surest way to increase the outturn of cocoons is to increase the outturn of mulberry. This can be done only by manuring the fields properly and by the extension of the area of the nurseries. The use of castorcake as a substitute for cowdung as a manure has been suggested and will be given a trial.

EXPENDITURE.

The total expenditure of the nurseries, including the office establishment, from 1st July 1915 to 30th June 1916 was as shown below:—

	Rs.	A.	P.
Salaries	5,320	0	0
Travelling allowance of the Superintendent ...	2,328	12	6
Pay of establishment	19,413	2	5
Travelling allowance of establishment ...	3,921	1	9
Stipends	361	6	8
Petty construction and repairs	6,335	9	3
Cost of land	11	4	6
Rates, rents and taxes	2,329	7	5
Rewards to nurserymen	477	0	0
Cultivation charges	33,207	10	5
Disinfection of village rearing-houses ...	3,826	14	7
Cost of microscopes	330	0	0
Miscellaneous charges	8,103	0	10
Total ...	85,965	6	4

Training of rearer's sons.

Instruction at sericultural schools was continued and 11 students passed their final examination during the year. Of this number 9 belonged to the Rajshahi Sericultural School and 2 to the Berhampore Sericultural School. One of the Berhampore students was paid a reward of Rs. 250. Most of the students have constructed model rearing-houses and have started rearing silkworms under the supervision of the Sericultural Department.

Industrial Exhibitions.

Sericultural exhibits were shown at two industrial exhibitions, one at Banjetia in the district of Murshidabad and the other at Suri, the headquarters station of the district of Birbhum. At Suri the Director of Agriculture, Bengal, was present accompanied by the Superintendent of Sericulture, Bengal.

A. C. GHOSE,

Superintendent of Sericulture, Bengal.

CALCUTTA,

The 14th July 1916.

ANNUAL REPORT ON THE WORK DONE AT THE SERICULTURAL RESEARCH STATIONS AT BERHAMPORE AND KURSEONG DURING THE YEAR ENDING 30th JUNE 1916.

1. This work, it will be remembered, was started by Monsieur F. Lafont whose services were secured by the Bengal Silk Committee for a term of three years in March 1912. The main object was the creation of crosses between the indigenous multivoltin races of silkworms and certain foreign univoltin races which would unite the best characters of both. In other

words, the object was to obtain a cross which would retain the native multivoltin character but yield more silk, the cocoons possessing the type and texture of those of silkworms reared in Japan, China, France, etc.

2. Some idea of the difference between the multivoltin native races of silkworms and one or two univoltin foreign races will appear from the following facts: a common Chhotopoloo cocoon (*Bombyx fortunatus*) with chrysalis weighs about 13·1 grains and contains 1·5 grains of silky matter (*i. e.*, cocoon without chrysalis); a common Nistari cocoon (*Bombyx cracsi*) with chrysalis weighs 13·8 grains and contains about the same weight of silky matter. But a cocoon (with chrysalis) of the French race known as Var reared at Berhampore by Monsieur Lafont weighed on an average 32·6 grains and contained 4·7 grains of silky matter; a cocoon of the Italian Japanese hybrid weighed 25 grains and contained 3·5 grains of silky matter. The difference may again be expressed thus: while 1,145 cocoons of Chhotopoloo and 1,090 cocoons of Nistari go into a seer, no more than 461 cocoons of Var and about 600 cocoons of the Italian Japanese hybrid race suffice to make up the same weight.

3. Monsieur Lafont began the experiments with the hybrid race Italian Japanese, the eggs of which had been kept in cold storage in Calcutta by Mr. Goodman of the firm of Messrs. Anderson, Wright & Co. He also obtained seed from France, Japan, China, Indo-China and Madagascar, and made various crosses between native and foreign races obtaining very large worms and fine cocoons at first, but there was a progressive diminution in the quality of the cocoons, from June 1912 to March 1913. The largest worms, giving the best cocoons, were not robust. They died from Flacherie, Gattine and Grasserie when the temperature was high; and in time the smallest only remained resembling the indigenous worms in size.

4. Unfortunately before he had proceeded far with his work Mons. Lafont's health broke down and he was obliged to cancel his agreement with the Silk Committee and go home. In his place Monsieur E. Grangeon, Professor of Sericulture in Madagascar, was appointed by the Bengal Silk Committee. Monsieur Grangeon arrived in Calcutta in December 1913, but left India in August 1914 to serve his country. I was associated with him from the day of his arrival at Berhampore and since his departure have been carrying on the work on the lines laid down by him.

5. M. Grangeon thought it desirable that the crosses which it was his object to evolve should possess yellow cocoons, and that the larvæ should either have the peculiar stripe markings of the Nistaries or should show no markings at all, accordingly as they were intended to take the place of the Nistaries or the Chhotopoloos respectively. The idea that the larvæ should have the above characteristics was a concession to the prejudice of the Bengal rearers against new things in general.

6. By careful and constant selection for successive generations at the different stages of their existence (egg, larva, chrysalis and imago) these cross-bred races have been brought to satisfy the above conditions. The results attained can be judged from the annexed tables showing the yield of silk for the different crops.

As a result of the crossings effected between various types of foreign races yielding white or pale yellow cocoons and the indigenous races yielding yellow cocoons, it may be said that the yellow colour of the cocoons behaves as dominant in relation to white or pale yellow colour and that "striped bodies" are dominant in relation to the "absence of markings" as far as larvæ are concerned.

In order to obtain widely divergent individuals and thus to enlarge the scope for selection each race is reared on a sufficiently large scale. A female silk moth yields at the least 300 eggs. By rearing 20 layings, the scope of selection is greatly enhanced. During the life cycle the promising types alone are kept, and the rest rejected.

Selection of Indigenous races.—In addition to the above an attempt is being made to improve the indigenous races by selection. It has been found that the Mysore race (*Bombyx meridionalis*) yields more silk than the Nistaries or Chhotopoloos. Its average is 1¾ grains per cocoon, whilst the average of Nistaries cannot be taken as more than 1½ grain.

The different Cross-bred types.

Crosses with the multivoltin Madagascar race.—The multivoltin silkworm race of Madagascar has been crossed with the indigenous Nistaries,

Chhotopoloos and Mysore races in various combinations. It can be definitely asserted now that the type obtained by crossing Madagascar male with Nistari female gives the best results. The other types are not so promising. From the Madagascar-Nistari cross we have selected out two types of worms according to their size; one, large, the other smaller but slightly bigger than the Nistaries. Both these types are breeding true for all practical purposes and the cocoons are all yellow. The smaller type is better suited to the climate of the plains. The cross types are yielding on an average 2¼ grains of silky substance per cocoon against 1¼ to 1½ grains by the Nistaries. The indigenous races yield silky material of which a large part is "floss," whilst in the cross more of the silky substance admits of being reeled and there is less waste.

In addition to these cross-breeds derived from crossing the Madagascar and the Nistari races we have evolved another type by crossing between an Accidental Bivoltin male and Nistari female as mentioned in my last year's report. This race has reached the 16th generation. The worms are breeding true to type and the cocoons are yellow.

It may not be out of place to mention that a type requires watching through many generations of rearing before it breeds true. Thus Toyama observes, "to get a pure white race from a mixed yellow race 65 years' selection has been practised in France" and the white race called "Sina," by careful selection for 75 years has been brought to such a state of purity that one does not even find a single yellow cocoon in millions of white cocoons." With a multivoltin race, however, the same work can be accomplished in much less time as a number of generations can be produced in one year. Our crosses are mostly at the 16th generation; whilst one type (Madagascar male crossed with Nistari female) which has been going on since the time of Mr. Lafont (1913) is at the 26th generation.

The history of this cross-bred race is as follows. After the departure of Monsieur Lafont, in January 1913, this race was simply reared without selection. When I took charge of the research in November 1913, pending Monsieur Grangeon's arrival, this race was at the 5th generation. The cocoons were of different colours and the worms showed various markings as they had not been selected and separated during the previous crops. I immediately introduced the selection of the cocoons according to colour, and the worms were sorted out according to the markings on their body. When Monsieur Grangeon took over charge of the work at the end of December 1913 he greatly elaborated the process of selection and gave the work a definite aim as I have already mentioned. As the selection went on at the 20th generation, more than three-fourths of the larvæ reverted to the old Zebra type. But since the race had not been subjected to proper selection from its beginning this phenomenon cannot be regarded as justifying the inference that the other crosses are also likely to revert to their dominant parental characters at the 20th generation. These are at the 16th generation now. They have been subjected to selection from the very beginning. So far they are breeding true to type in most cases. It remains to be seen whether these will revert or not as in the previous case.

The pure Madagascar race and its drawbacks.

The pure Madagascar race is a multivoltin yielding five generations in a year; whilst the cross-bred types yield seven generations in a year. But the crosses are far more hardy than the pure race. Monsieur Grangeon in his annual report for the year ending 30th June 1914, thus describes the race:—

"*Race A.*—Pure Madagascar giving very big cocoons. This race has undergone two generations in Bengal in the cold season. It is this variety which gives the largest cocoons and the biggest worms. The cocoons are double the size of those of Italian Japanese. But the voyage during which the worms hatch out *en route* greatly weakens the race. A great many of the worms die of Flacherie during the rearing and the cocoons are far smaller than those obtained from the same race in Madagascar. The eggs change colour the day after the laying, similarly to those of the Univoltins." On the other hand the Nistari eggs change colour on the day before hatching. He adds "In the good season the pure Madagascar nourished with tender leaves, die of grasserie to the extent of 95 per cent. Crossed with the Nistaries, they yield in June with the bad leaves about 45 per cent. of good cocoons." This would explain why he did not consider it necessary to preserve the pure Madagascar race.

Monsieur Lafont, too, in his report on the results obtained in the experiments for improving sericulture in Bengal (published in 1914), devoted a paragraph to the "Polyvoltin races of Madagascar." He had tried to obtain three different lots from Madagascar, but in two cases the eggs hatched out on the way and all the worms died before arrival. One attempt was, however, more successful and out of "1,040 worms, which looked very fine up to the fourth moult" he got a crop of only 20 cocoons. From these were obtained a laying of the pure Madagascar race and several layings of cross-bred (Madagascar Male crossed with Nistari Female) about the 1st February 1913, the day after his departure from India. When I took charge of the research work, pending Monsieur Grangeon's arrival, I did not see any pure laying and I was told by the Overseer who had been working since the time of Monsieur Lafont that the pure race had died out.

From the above it is evident that the existing conditions of mulberry cultivation are not suitable for the pure Madagascar race as even the lower leaves of the bushes are too tender for them. Besides, the climate of the plains from March to November is unsuitable for that race. Before his departure Monsieur Grangeon wrote to Madagascar for fresh seed, but this cannot be obtained at present owing to the war.

Kurseong Sericultural Station.

On account of the severity of the season from May to August, as also on account of the poor quality of the leaves in the plains, Monsieur Grangeon suggested the starting of a nursery in the Darjeeling district. Work was commenced here in May 1915. The results of the first crop were given in my last year's report. The following tables show the results of the subsequent crops :—

The August crop of 1915.—The seed was reared from the outturn of the May-June crop of 1915. The worms were fed from bush mulberry planted in the nursery grounds according to the system prevalent in Bengal. It will be seen that there was some decrease in silk as compared with the May-June crop of 1915. This was due to the shortage of leaves during the months of May and June 1915 in our plantation in consequence of which the worms had to be fed with leaves from wild mulberry trees found in Kurseong. This caused a number of deaths from flacherie and grasserie. But in the August crop of 1915, the worms were very healthy. At Berhampore again, the lot received from Kurseong at the end of the May-June crop of 1915 was quite healthy, whilst the lot which was continuously reared at Berhampore throughout the year showed a number of deaths in spite of the fact that the yield of silk per cocoon remained the same.

Serial No.	Names of Races.	Average weight of silky substance in one cocoon.		
		Kurseong station.	Berhampore station.	Berhampore station.
		Seed obtained from rearing in May, *i.e.*, 2nd generation in the hills, 10th generation.	Seed obtained from Kurseong and reared without crossing in September 1915. 11th generation.	Seed reared continuously at Berhampore without being sent to the hills.
	Big worms.	Grs.	Grs.	Grs.
1	Madagascar male crossed with Nistari female.	2	2	2⅓
	Small worms.			
2	Madagascar male crossed with Nistari female.	2	2¼	2½
3	Accidental Bivoltin male crossed with Nistari female.	2½	2¼	2
4	Accidental Bivoltin male crossed with Nistari female	2½	2¼	2½

Serial No.	Names of Races.	Average weight of silky substance in one cocoon. Berhampore station. Seed obtained from Kurseong after one rearing there and recrossed at Berhampore and reared.
	Big worms.	Grs.
1	Madagascar male crossed with Nistari female (male crossed with Nistari female, 1st generation).	2
	Small worms.	
2	Madagascar male crossed with Nistari female (male crossed with Nistari female, 1st generation).	2
3	Accidental Bivoltin male crossed with Nistari female.	2¼
4	Accidental Bivoltin male crossed with Nistari female.	2¼

The October crop of 1915.—As a small quantity of leaf was available, a small crop was reared from the seeds derived from the outturn of the last crop. The result is shown in the following table :—

Serial No.	Names of Races.	Average weight of silky substance in one cocoon. Kurseong sericultural station.	Berhampore sericultural station.
	Big worms.	Grs.	Grs.
1	Madagascar male crossed with Nistari female.	2½	2¼
	Small worms.		
2	Madagascar male crossed with Nistari female.	2½	2¼
3	Accidental Bivoltin male crossed with Nistari female.	2	2
4	Accidental Bivoltin male crossed with Nistari female.	2	2½

The May-June crop of 1916.—This year the experiment is being tried on a larger scale, and it is also intended to ascertain whether it will be more advantageous to rear a race consecutively for three generations in the hills or whether only one rearing will be sufficient.

The following table shows the percentages of yield of the different, cross races and their yield of silk for this crop :—

TABLE A.

Berhampore Sericultural Station (seed-cocoons derived from March-April at Berhampore).

Serial number.	Name of Races.	Average number of eggs per laying.	Date of hatching.	Date of spinning.	Total number of feeds given.	Total quantity of leaves consumed per laying.	Total outturn per laying.	Percentage of yield per laying.	Average weight of silky substance in one cocoon.	Average weight of worms before spinning.
			1916.	1916.		Srs. ch. t.	K. p. g.	Per cent.	Grs.	Grs.
	No. 1.									
1	Accidental Bivoltin male crossed with Nistari female, 15th generation.	430	4th May ...	4th June ...	108	1 13 0	0 2 4	41	1½	38
	No. 4. Small worms.									
2	Madagascar male crossed with Nistari female, 15th generation.	410	4th May ...	1st June ...	108	1 4 0	0 2 12	50	1½	39
3	Pure Nistari	340	4th ,, ...	1st ,, ...	108	1 2 0	0 2 10	57	1½	29

Kurseong Sericultural Station (seed-cocoons derived from March-April crop at Berhampore).

Serial number.	NAME OF RACES.	Average number of eggs per laying.	Date of hatching.	Date of spinning.	Total number of feeds given.	Total quantity of leaves consumed per laying.	Total outturn per laying.	Percentage of yield per laying.	Average weight of silky substances in one cocoon.	Average weight of worms before spinning.
	No. 1.		1916.	1916.		Srs. CH. T.	K. P. G.	Per cent.	Grs.	Grs.
1	Accidental Bivoltion male crossed with Nistari female, 15th generation.	500	5th May ...	7th June ...	114	2 3 5	0 5 5½	84·4	3½	50
	No. 4. Small worms.									
2	Madagascar male crossed with Nistari female, 15th generation.	390	7th May ...	7th June ...	108	1 10 14	0 3 19	81	3	40
3	Pure Nistari	335	9th ,, ...	9th ,, ...	108	1 8 0	0 3 10	83·5	1½	35

The percentage of yield has been arrived at by calculating from the average number of eggs laid and the total outturn per laying.

The following table is given to show the condition of the seed-cocoons from which the seed is derived for the Kurseong experiments, *i.e.*, the table for the March-April 1916 crop at Berhampore.

Serial number.	NAME OF RACES.	Average number of eggs per laying.	Date of hatching.	Date of spinning.	Total number of feeds given.	Total quantity of leaves consumed per laying.	Average yield per laying.	Percentage of yield.	Average weight of silky substance in one cocoon.	Average weight of worms before spinning.
	No. 1.		1916.	1916.		Srs. CH. T.	Khs. P. G.	Per cent.	Grs.	Grs.
1	Accidental Bivoltin male crossed with Nistari female, 14th generation.	430	17th March ...	12th April ...	108	1 5¼ 0	0 3 0	56	2	39
	No. 2.									
2	Accidental Bivoltin male, crossed with Nistari female, 14th generation.	405	17th & 18th March.	12th, 13th & 14th April.	108	1 4 0	0 2 3¾	43	1¼	36
	No. 3. Big worms.									
3	Madagascar male crossed with Nistari female, 14th generation.	423	18th & 19th March.	13th & 14th April.	108	1 4¾ 0	0 2 16¼	53	2	40
	No. 4. Small worms.									
4	Madagascar male crossed with Nsitari female, 14th generation.	410	18th & 19th March.	13th & 14th April.	108	1 3¼ 0	0 3 5	63·5	2¼	44
5	Pure Nistari	337	18th & 19th March.	13th, 14th & 15th April.	108	1 0 0	0 2 0	47·5	1½	30
6	Pure Mysore	320	21st & 22nd March.	20th & 21st April.	108	1 1¾ 0	0 1 16	45	1¾	31

Only two days' hatchings was kept in all cases.

Weight of leaves only was taken and the branches were separated before weighing.

This year the crops suffered greatly from a prolonged drought and excessive heat. The quality of the leaves was consequently very bad. The temperature inside the rearing house at Berhampore reached 94° F. in April and the maximum temperature in the shade was 115° F. It was very injurious as 70° F. to 80° F. is considered to be the optimum temperature for silkworms.

From the above tables it will be seen that the crossraces do not stand alone as regards degeneration during the months of May to August. The

indigenous race of Nistari silkworms, though showing slightly more resistance, as can be seen from its greater percentage of yield cannot be said to be more productive when the yield of silk of the different races is taken into consideration.

Yield of silk.

The following table is prepared to show the yield of silk of the different races for the Agrahani crop (October 1915)—

Serial No.	Names of races.	Generation.	Average weight of worms.	Average weight of silky substance in one cocoon.	Number of cocoons required for one seer of raw silk.	Weight of floss in producing one seer of raw silk.
	Striped.		Grs.	Grs.	K. P. G.	Tola. As.
1	Accidental Bivoltine Male crossed with Nistari female.	Twelfth generation seed obtained from Kurseong and reared without crossing.	50 to 55	2¾	5 11 0	18 0
	No marks.					
2	Accidental Bivoltine male crossed with Nistari female.	Ditto ...	55 to 58	2½	6 6 0	8 8
	Big worms.					
3	Madagascar male crossed with Nistari female.	Ditto ...	65 to 68	3	5 0 0	10 0
	Small worms.					
4	Madagascar male crossed with Nistari female.	Ditto ...	60 to 65	3	5 3 0	9 1
5	(Accidental Bivoltine male crossed with Nistari female) male crossed with Nistari female cross with No. 1 Type.	First generation seed obtained from Kurseong after crossing.	45 to 48	2½	7 10 0	20 0
6	(Accidental Bivoltin male crossed with Nistari female) male crossed with Nistari female cross with No. 2 Type.	Ditto ...	40 to 43	2½	7 10 0	23 4
7	(Madagascar male crossed with Nistari female) male crossed with Nistari female cross with No. 3 Type.	Ditto ...	50 to 56	2¼	6 4 0	34 8
8	(Madagascar male crossed with Nistari female) male crossed with Nistari female cross with No. 4 Type.	Ditto ...	49 to 53	2⅓	6 1 0	38 4
9	Pure Nistari	.....	35 to 40	1½	12 4 0	46 0
10	Pure Chhotopoloo	.....	21 to 25	1¼	16 0 0	40 0
11	Pure Mysore	.....	31 to 35	1⅝	10 0 10	31 0

Rearers' system.

As it is intended ultimately to give to the rearers crosses of the types with one-fourth superior foreign blood and three-fourth indigenous blood each of the types is recrossed and then reared according to the system in vogue with the rearers. The idea is to test their power of standing the rough and drastic treatment in the rearers' hands.

Summary.

From the general results obtained in the course of our experiments with these cross types, it appears that the crosses thrive very well during the

period from October to April and even during the hot season from May to August. Although their percentages of yield are less than those of the indigenous varieties, this is to a great extent counterbalanced by their richness in silk. It has also been noticed that these crosses show greater resistance to Pebrine than the Nistaries which again is far more resistant than the Chhotopoloos. Regarding *flacherie* and *gattine*, and perhaps even *grasserie*, Monsieur Lafont found that "hybrids are much more robust than the pure races." In our experiments, we have found ample evidence to corroborate Monsieur Lafont's views.

PROBHAT CHANDRA CHAUDHURI,
Superintendent of Sericulture, Berhampore
in charge Sericulture Research, Berhampore.

ANNUAL REPORT ON SCIENTIFIC WORK IN CONNECTION WITH SILK FOR THE YEAR ENDING 30TH JUNE 1916 DONE BY MISS M. L. CLEGHORN, F.L.S., F.E.S.

In April 1916 a grant of Rs. 10,000 was sanctioned by Government for the extension of my silk experiments and research.

My silk laboratory has been much enlarged, the three control rearing houses for village rearers completed, and a new mulberry plantation of about 8 bighas of land in Hastings House, which was very kindly given by the Hon'ble Mr. W. W. Hornell, Director of Public Instruction, has been dug up and planted out with about 400 thin-sweet-leaved male mulberry, and part of the plot is being prepared for the cultivation of bush mulberry according to indigenous methods.

Mr. H. Maxwell-Lefroy, Imperial Silk Expert, who was deputed by the Secretary of State to report on the silk industry, visited my Sericultural Laboratory and expressed much satisfaction at the way in which the work was being carried out. Mr. Lefroy suggested that a comparative trial should be made between my hybrid race and the indigenous Nistari and Desi. So a large education of the 41st generation of my multivoltin hybrid race, started in January 1911, was reared, and a kahan of seed cocoons of this generation was forwarded to Mr. J. de Minvielle, Manager of Messrs. Anderson, Wright & Co's. Rose Filature Concern at Ramnugger. The trial cocoons reared at Ramnugger were of the 42nd generation of my cross, and the worms from start to finish gave no trouble in spite of very hot weather, and were healthy throughout the education. These cocoons gave about 36 per cent. better produce than the control Nistari and Desi which were reared at the same time, and went 12 kahans 12 pons, to the seer of silk, while the control Chotapolu went 18 kahans 10 pons, and the control Nistari 17 kahans 14 pons to the seer of silk.

This hybrid race between the Italian-Japanese and Nistari, which was started in January 1911, has been reared on a very large scale since September 1915. From this, six groups, each consisting of hundreds of families, have been selected and are being reared separately.

A very rigorous selection is being made not only with regard to the cocoons, but also with regard to the moths and layings. The best layings only are kept from moths which have lived many days after their eggs hatch. I have found that selections for longevity alone gives very good results in making the race vigorous and immune to disease. Many of the moths live over 20 days, some about 24 days and one male moth lived nearly two months.

A black race of worms of a very dark grey colour has been obtained from five black mutations which appeared in family 303 of the 37th generation. The 37th generation was the first to be reared on a very large scale since the cross was started in January 1911. The worms owing to their dark colour are almost invisible among the mulberry leaves, and on this account the native rearers would probably have nothing to do with them. However, their dark colour may be of some use as the silkwormfly would have difficulty in finding them out. In their dark velvety markings they much resemble the larvæ of the wild silkworm, Theophila huttoni, and are probably a throw back to some ancestral type, and are interesting on this account.

I received a letter from Dr. W. S. Sutherland of the Scottish Universities Mission, Kalimpong, asking for advice regarding silkworms. I gave him

all the necessary assistance regarding them and also sent him fifteen layings of the 44th generation of my hybrid race. They were reared at Kalimpong, without a single loss during the education, and the cocoons produced were large and firm and of good texture. Dr. Sutherland has also planted out, in a special plot, 250 thin-sweet-leaved malo mulberry plants which I sent him as I have found that silkworms fed on this variety give the best results. It is hoped that when there is enough of this mulberry that at least three crops a year of my cocoons may be obtained at Kalimpong for reeling in Bengal filatures.

M. L. CLEGHORN.

ANNUAL REPORT ON THE WORKING OF THE SERICULTURAL SCHOOL, RAJSHAHI, FOR THE YEAR ENDING 30TH JUNE 1916.

The school was made over to the Government in January 1907. Since then it is being managed by a Managing Committee under the Director of Agriculture, Bengal.

The school teaches practical methods of—

(*a*) Mulberry cultivation.
(*b*) Microscopic seed selection.
(*c*) Detection and prevention of silkworm diseases.
(*d*) Rearing of silkworms.

The school has in possession 22 bighas of land at Kadergunj within a mile of the school; of this 16 bighas are under mulberry cultivation against 15 bighas of the previous year.

The cocoons grown in this school are gaining popularity among the Busnis. They take cocoons from this school for their seeds.

Four crops of cocoons were raised in this school in the year under report, namely:—in July and September 1915, January and April 1916, amounting to 283 kahans 2 pans of cocoons, of which 11 kahans were kept for microscopic examination in the class, and the rest was sold as seeds to the Busnis of different joars of this as well as of Malda district. The receipt was Rs. 438-6 against Rs. 389-10 of the previous year.

Teaching Staff.—There is a head-master who teaches Sericulture and with the help of a rearer practical rearing is taught. The head master from time to time visited the model rearing houses of passed students and gave instructions to the village Busnis regarding silkworm rearing.

Model nurseries:—Have been started by the *ex*-students of the school and arrangements have been made to inspect the nurseries and to see how they make profit by rearing silkworms. Quarterly reports of the model nurseries are called for and received. They show that the nurseries are doing well.

Students:—There were 11 boys in the beginning of the year; nine appeared in the final Examination and all passed. They would receive their rewards in the next winter. Eight boys of the previous year received second instalment of their rewards. There were 12 boys on the roll on the 30th June, five of whom are Muhamadans and seven Hindoos. The students cultivate a plot of ground each measuring one cottah.

Microscope:—There were seventeen microscopes of which two were given to passed students in the year under report; 15 fifteen are in stock.

Half-yearly Examination:—The half-yearly Examination is just over. The result of which has not yet been out.

Receipt.

	Rs.	A.
Sale-proceeds of seed-cocoons	438	6
Government	7,059	10
Total ...	7,498	0

Expenditure.

	Rs.
Establishment	875
Stipend	1,008
Appliances	102
Books and maps	24
Annual repairs	580
Furniture	50
Rewards	2,250
Taxes, rents	147
Contingencies	2,462
Total ...	7,498

Discipline:—No case of breach of discipline has come to the notice of the school authorities in the year under report.

Visitors:—The school was visited by the Superintendent of Sericulture, Bengal, on the 21st April 1916, Director of Agriculture, Bengal, on the 22nd April 1916.

Meetings:—The Managing Committee held three meetings during the year under report.

K. BANERJI,

Secretary, Sericultural School, Rajshahi.

ANNUAL REPORT OF THE WEAVING MASTER FOR THE YEAR ENDING 30TH JUNE 1916.

During the year ending with 30th June, 1916, I was out on tour for 321 days. The work done in the different districts is given below:—

1. I visited English Bazaar, Shujapur, Sibgange, Kaliachuck, Gayazabari, Amanigange Hât, Dariapur and Chowdala, in the district of Malda, in connection with the demonstration and introduction of the improved Reeling Machine, which I have constructed to facilitate the reeling of fine deniers of silk, with uniform and accurate crossings. As this has been constructed without altering the measurements of the frame or of the swifts of the old machine, the reelers find it very easy to add the improvements to their existing machines. They prefer to use this improved machine whenever they have to reel silk of fine deniers. The six machines that were distributed among selected professional reelers of Shujapur and the surrounding villages on trial have been much appreciated and the price of the machines being realized by instalments. The Reeling Machine was also fully demonstrated to the reelers of English Bazaar and other reeling centres of the district and an effort was made to improve their method of reeling by my paying frequent visits to those centres during the reeling seasons. The efforts to introduce improvements in cocoon boiling and other preparatory processes, though appreciated by the reelers did not meet with much favour on account of the initial expenditure of the processes. At Sibgange and the surrounding villages an improved method of weaving fine silk and mutka fabrics were demonstated and the weavers were aided in procuring finer weaving accessories and appliances that will ensure better results both as to quality and quantity. They also showed much interest in my demonstration of method of weaving fine selvage borders for *Dhoties*, *Sarri's*, etc.

2. I visited Gopalnagar, Basadhipur, Sherpur in the District of Murshidabad in connection with the work begun in the previous year of improving the present methods in preparing wool for weaving. The absolute removal of yolk and other dirty matter from the shorn wool, can be effected by washing firstly in cold water and then, in slightly alkalinated water, preferably in a weak solution of soft soap which renders it soft and glossy. Next an application of Sulphur dioxide fumes to the moistened wool bleaches it white. This along with other improved processes was demonstrated to the wool weavers. At Mirzapur, in the Murshidabad district, the silk weavers wanted my help in getting them a doubling machine to prepare their organzine (warp threads). The method in vogue is to twist the individual reeled threads separately by means of top-spindles and then to double and twist them—a method very crude and exceedingly slow and expensive requiring more time in the preparation of the warp alone than in the actual weaving. I am constructing an automatic twisting and doubling machine, which would fully answer the requirements of the weavers. I visited Soampara, Beldanga, Jayakrishnapur and Dopukria in connection with silk reeling and pointed out to the filature reelers how the improvements I had introduced in my machine could be easily grafted on the filature reeling machines at a nominal expenditure. I visited Berhampore to test the working of a "Twisting Frame" that had been sent from Pusa for introduction among the Bengal Silk Reelers. The "Frame" was intended to put in croisures on reeled thread up to 350 instead of 2 or 3 croisures in vogue among the Bengal reelers. The frame was tested in the presence of Mr. Lefroy and others, strictly following the instructions given in the Bulletin, and it was found that while reeling, the silk could not stand the frictional resistance when even 15 to 20 croisures were applied to it. Again, the frame in practice

proved unsuitable for Khamru silk reelers who rotate their swifts at a very great speed with as little friction to the thread as possible to avoid constant breakages. Further, the frame was too large to be applied or attached to the village reeling machines and any alteration of its size would materially defeat the object for which it was constructed. On the other hand, if the village reelers were asked to place their reeling machine in such a position as to suit the height of the frame they had to alter their whole pedestal arrangements, which is absolutely impossible. Owing to the above drawbacks, it was not considered suitable for the village reelers.

3. I visited Rajbari, Gopalganj, Madaripur and Bhanga in the district of Faridpur in connection with the demonstration of improved looms, warping apparatus and other weaving accessories and also with the object of organizing weavers' Co-operative Societies. At Najirpur, Nurpur and Paschim Sadardhi in Bhanga the weavers' Co-operative Societies organized by me are still in working order. To help the societies in every way, I visited the localities from time to time and made arrangements with an agent at Calcutta to supply them with genuine raw materials at a cheap rate. Grey and fast coloured yarns have been supplied to them and arrangements made with the agent to find a ready market for the manufactured fabrics, if necessary. The fabrics, however, are at present sold locally.

4. I visited Gangarampur, Sibpur, Tarabaria, Nischindapur, Dogachee, Kamarpara in the district of Pabna and demonstrated the advantages of using the flyshuttle loom and other improved appliances. Arrangements were subsequently made, at the request of the local weavers, to organize weavers' societies in the above localities and the recommendations were forwarded to the Registrar of Co-operative Credit Societies through the Central Bank of Pabna. When the societies come into existence, every assistance will be given to them. At Dogachee, the reed-makers were given help by procuring orders for them for coarse and fine counts of bamboo reeds from the weavers of Birbhum and Tippera districts and arrangements were also made to supply the reed-makers with highly seasoned bamboos from Japan so as to enable them to make very fine counts of reeds suitable for fine silk weaving. I visited the village of Nuthun Bharenga in the Pabna district and enlisted fresh members from the adjoining villages of Bagchor and Eadarkpore to the existing weavers' society of old Bharenga, casting off the old members who did not observe the byelaws of the society. The matter was reported to the Registrar of Co-operative Credit Societies. Further, the members were given every facility to acquaint themselves with the advantages of flyshuttle looms and to obtain raw materials in lieu of their manufactured fabrics which would otherwise have been stored owing to the want of a ready market.

5. I visited Tangail and Netrakona in the Mymensingh district. At Bajitpur, in Tangail, the Co-operative Weavers' Society that was organized by me at the instance of the Registrar of Co-operative Credit Societies is still in existence. This society gets its raw materials from the local bazaar, and sells the manufactured fabrics either locally or through mahajans. As the weavers of Bajitpur use finer counts of yarn than can be woven with flyshuttle looms, a demonstration of an improved warping process was held for their benefit. As desired by the Subdivisional Officer of Tangail, I inspected the local weaving school that is maintained by the Local Board and found that the local weavers had derived no benefit from its existence, as it worked in its own way without reference to local requirements. The school had been originally organized by me and rules had been framed for its working in consultation with the local weavers with due regard to practical requirements. In my opinion, unless the weaving school model is strictly adhered to demonstrating methods of weaving with the help of improved but inexpensive appliances and showing how those improvements tend to save labour and money, little success will be obtained in attracting the weaver nor will he allow his boys who now assist him in his work at home to waste their valuable time in such a school. I reported the state of affairs to the Subdivisional Officer and stated my views in the visitor's book kept by the school. I have also suggested, that the school should, as far as possible, show how some of the locally current standard fabrics could be improved both as to their quality and quantity, working for a comparative study their existing looms and the improved ones of the school side by side. At Netrakona, I visited the weavers' localities as desired by the Subdivisional Officer, and at the request of local weavers I arranged to get them fast coloured yarn at an advantageous rate. In order to conduct weaving demonstrations among the weavers and to supply them with raw materials at reasonable rates, it was

suggested to the Subdivisional Officer that an organization of weavers' society would be very desirable, and he proposes to recommend the matter to the Registrar of Co-operative Credit Societies.

6. I visited Nawabpore, Tatibazar and Kanchan, in the district of Dacca and inspected the work of the local weavers. The co-operative weavers' society, proposed by me, was not started among the weavers for want of sufficient working capital. I gave them instructions and suggestions towards the improvement of their industry and the disposal of their manufactured fabrics.

7. I visited Dhuriail, Barisal, Dhamdoba, Kasipore and Madabpasha in the district of Backerganj and inspected the work of the weavers of the above-mentioned places where I had given weaving demonstrations on a former occasion. The weavers having expressed their desire to find a ready market for the sale of their manufactured stuffs, arrangements were made to get their surplus cloth sold at the Dacca and Calcutta markets.

8. I visited Bairagi Hat, Purvachandrapur and Azizfazilpur in the district of Noakhali and inspected the work of weavers in these places where I had given weaving demonstrations and found that the weavers adhered to the improvements demonstrated by me, as far as possible. Though the weavers were fully convinced of the utility of the flyshuttle loom, the improved warping apparatus, etc., they expressed their inability to purchase a full set for want of sufficient funds.

9. I visited Bolkhali, Sorkijipur, Tatipara and Dholghat in the district of Chittagong and demonstrated to the weavers the use of the improved flyshuttle loom and its accessories.

10. I visited Bankura and Bishnupur in the district of Bankura to inspect the progress of weaving in those localities. I found the industry in a satisfactory condition as the weavers were being given every help through a "Relief Committee." I learned that they were trying to organize a weavers' co-operative society and were approaching the Registrar of Co-operative Credit Societies for the necessary help.

11. I visited Ramjibanpur, Ghatal and Daspur in the district of Midnapur and inspected the work of the weavers. The coloured yarns and other weaving materials which they stood in great need of were at first obtained from the Calcutta market. As most of the weavers, however, had dealings with local mahajans, they stopped further purchase of yarn from Calcutta to please them. In order to improve the industry, other improved weaving accessories are being supplied to them on their requisition.

12. I visited Hitampur, Tatipara, Kharida, Bistupur, Badrapur and Suri in the district of Birbhum with a view to improve the local tassar weaving and reeling industry. My improved method of reeling wild muga tasar cocoons by means of a reeling machine was first demonstrated during the Exhibition at Suri when I pointed out to the reelers how, instead of reeling the cocoons in their usual way on conical reels which render the silk gouty and curly, a more lustrous and uniform thread could be reeled from the same cocoons in less time by adopting improved appliances. The reelers were fully convinced of the advantages of the improvements and readily took them up. Further, during the same exhibition, I demonstrated side by side the advantages of the flyshuttle loom and the improved accessories over the existing hand loom of the district. At the request of the weavers of Kharida and Tatipara, I got for them improved appliances for their use. The District Board of Birbhum had a flyshuttle loom in parts in the godown. It was arranged through the Collector to get the loom repaired under my supervision and to hand it over to a selected weaver of Kharida, so that, it might be kept working for the benefit of other weavers in the village. Arrangements were made to supply six similar flyshuttle looms to the Kharida and Tatipara village weavers who consented to remit the cost of the looms by instalments. It was also arranged with the Collector's approval to have a Weavers' Co-operative Society at Kharida if the Registrar of the Co-operative Credit Society agreed. The inspector of weavers' co-operative societies has submitted the proposal at the Collector's request to the Registrar.

13. I visited Serampore, Chinsura and Tribeni in the district of Hooghly. I visited the Government Weaving Institute, Serampore, to see the working of a "Dobby" used for weaving border designs and to recommend the same to the weavers of Bengal, if it fully answered local requirements. It was found, however, that its work was very slow and would not stand commercial competition. I visited Chinsura to see the work of the weavers who made mosquito curtains. Having been informed locally that a great number of weavers resided in Hooghly and Burdwan, I visited the village of Tribeni in the district of Hooghly to arrange for the organization of an "Industrial

School" in aid of the "Poor Peoples' Industrial Home" under the patronage of the Maharaja of Burdwan. The institution is mainly intended to organize, develop and demonstrate Cottage industries so as to help poor people who are able and willing to work. The Sub-Registrar of Calcutta, who is the Secretary to the Association, desired me to organize a weaving school at the outset and to supplement it later on, as funds would permit, with other industries, such as silk reeling, mutka spinning, carpentry and wood carving. The building erected for the above purpose is being completed. As desired by the Secretary, the looms and other equipments are also being made ready under my personal supervision so as to start work from August next.

14. I visited Darjeeling to inspect the progress of weaving among the Bhutias with whom weaving has always been an important domestic industry. As desired by the Deputy Commissioner who introduced me to the Secretary to the Technical School and the Chief of the Bhutia Settlers in Darjeeling, I visited the "Bhutia Bustis" and found them containing more than 300 houses in which weaving was carried on. They manufacture "Lapcha Chadar," a coarse fabric like "Poplin" having colored longitudinal stripes and warp faced designs worked out at regular intervals. The Chadar is generally woven separately into three equal stripes and is converted into a full sheet by sewing together the selvages. The method of weaving is quite antiquated. Each strip is woven 8 feet long and 20 to 22 inches broad. The warp threads are twisted and doubled by means of top spindles. They generally prepare a warp of 10 feet long to weave a strip of 8 feet, the operation being similar to tape weaving. The work is necessarily very slow. The Secretary desired me to demonstrate improved methods in weaving in his Technical School, so as to enable the weavers to produce complete sheets instead of separate strips and by saving time and labour to reduce the cost of production. A new flyshuttle loom and other complete appliances and accessories that will fully suit their requirements are being prepared for their use and when they are ready they will be established in the Technical School and demonstrated for their benefit. At the request of the Secretary, arrangements have been made with a Calcutta Agent to push the sale of the Lapcha Chadars in Bengal and eleswhere. The Agent assures me that he will be able to get a ready market for them provided the price of the article can be reduced without affecting its quality. This can be done only by the introduction of flyshuttle looms and other labour-saving appliances and accessories.

N. N. PILLAI,
Weaving Master for Bengal.

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ANNUAL REPORTS

OF THE

EXPERT OFFICERS OF THE DEPARTMENT OF AGRICULTURE, BENGAL,

FOR THE YEAR ENDING

30TH JUNE 1917.

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ANNUAL REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, WESTERN CIRCLE, BENGAL, FOR THE YEAR ENDING 30th JUNE 1917.

Charge.

1. I was in charge of the Western Circle throughout the year.

During the period under review, I supervised the work at the Chinsura, Burdwan and Kalimpong Farms, controlled the demonstration work in the Burdwan and Presidency Divisions, organised departmental exhibits at agricultural exhibitions in these divisions, supervised the two divisional seedstores, attended meetings of agricultural associations and helped to check jute areas in Western Bengal.

Tours.

2. During the year I was on tour 165 days and spent the following periods in the various districts noted below :—

Hooghly ...	... 24 days.	Nadia ...	... 8 days.
Burdwan ...	... 18 „	Murshidabad	... 5 „
Darjeeling ...	... 40 „	Jessore ...	... 4 „
Birbhum ...	... 20 „	Midnapur	... 2 „
Bankura ...	... 14 „	Khulna ...	... 1 day.
24-Parganas	... 14 „	Rangpur ...	... 3 days.
Faridpur ...	... 1 day.	Sonepur ...	... 3 „

Most of my time was taken up with the farms at Chinsurah, Burdwan and Kalimpong and with demonstration work in districts where district agricultural officers are maintained by this department, viz., Birbhum, Bankura and 24-Parganas. Very successful work has been accomplished in these three districts and particularly so in Birbhum and Bankura where the District Magistrates, Messrs. G. S. Dutt and A. W. Cook, C.I.E., took a personal interest in our work.

When a piece of work has been successfully demonstrated, to make it popular it is necessary to get the support of the District Magistrate. Through Mr. Dutt's support, energy and keenness in Birbhum we have been very successful with bonemeal as a manure for rice and with groundnuts. Not a little of the success achieved was due to the support and influence of the Divisional Commissioner, D. H. Lees, Esq., who took a personal interest in the demonstration work out in the districts. In connection with the jute forecast in Western Bengal I visited every subdivision where jute is of importance.

Weather.

3. Agriculturally speaking the weather was very unseasonable in 1916 in Western Bengal. The drought in May and the heavy rain of June were adverse to the jute crop, while the drought in July helped the jute crop to revive somewhat in places, but delayed transplanting of rice and made the season very unfavourable in some parts, particularly Hooghly, for this crop.

The season for rice in the districts of Birbhum, Burdwan, Bankura and Midnapur where little or no jute is grown was good, except for the damage caused by floods in Birbhum and Burdwan.

The season in Darjeeling was satisfactory for maize, rice and marua.

4. *Farms.*—A. Chinsurah.
B. Burdwan.
C. Kalimpong.

A. Chinsurah.—The season was very unfavourable for both jute and rice. The drought of May, when less than half an inch of rain fell on one day, followed by heavy rain in June made the crop precarious. Luckily a partial drought set in in July and continued to the middle of August. This allowed a crop to be grown, but only about 50 per cent. of a normal outturn

was obtained. The heavy rain of the latter half of August and September made it possible to obtain any rice crop at all. Previous to this period the prospects were very dismal. The late transplanting only permitted a poor crop to grow, for after October, practically speaking, no more rain fell. Bearing these facts in mind it is easy to understand the difficulty we had in transplanting the large area of 90 acres of rice in the short time at our disposal. Small areas of two or three acres can easily be transplanted in an adverse year like this, but a large area becomes almost impossible. A casual glance at the total rainfall recorded on this farm would be entirely misleading without going into details, for 56·90 inches fell as compared with a normal of 58·30 inches. The average outturns of 10 maunds or 820 lbs. of rice per acre from 87 acres instead of 2,000 lbs. and 8 maunds or 656 lbs. of fibre per acre from 33 acres instead of 1,600 lbs. per acre gives one a better idea of the unfavourable season. Mr. Hector's Dacca No. 1 or Indrasail paddy from Dacca was tried on a small scale and on half an acre gave an outturn at the rate of 1,810 lbs. per acre as compared with 1,772 lbs. from Nagra the local variety. On another plot of one acre, Indrasail yielded 1,466 lbs. as compared with 1,056 lbs. from Nagra, while on a further one-fifth acre plot this variety yielded at the rate of 1,640 lbs. as compared with 1,366 lbs. from Nagra.

This year a larger area of Indrasail will be grown when more definite figures should be obtained.

With such poor outturns from the adverse season it is obvious that there is little to be said this year about varieties, manures and methods of cultivations for those favoured cultivators who have small areas and low plots where water can be accumulated and procured easily did better than we did. Large areas locally, however, produced little or no paddy crop. This was a year when the value of irrigation would have been forcibly demonstrated. We were not in a position, however, to irrigate either in May for jute or in July for paddy and so missed the opportunity of a first-rate demonstration. We hope to remedy this defect shortly.

Mr. Finlow's jute varieties Kakya Bombai and Rajshahi Tosha were also tried on a small scale, but were not sufficiently superior to the local Hooghly Deshi to warrant our giving up Hooghly Deshi—

	Yield per acre.
Corchorus capsularis Kakya Bombai ⅛th acre ...	... 1,304 lbs.
Corchorus olitorius Hooghly Deshi ⅛th „ ...	... 1,290 „
Corchorus olitorius Hooghly Deshi 1 „ ...	... 1,010 „
Corchorus olitorius Rajshahi Tosha 1 „ ...	... 1,036 „

Further work is being carried out by Mr. Finlow and we hope to obtain a variety superior to the local seed for yielding capacity when larger areas will be grown.

In spite of the season, however, dhaincha greenmanure on paddy gave an increased outturn of 378 lbs. of paddy per acre over the unmanured plot.

Below I give the Superintendents' reports *verbatim.*

The chief definite recommendations that we have to make as the result of work done on this farm are—

1st for paddy—A. The Nagra variety is the best variety for the Hooghly District.

B. Dhaincha greenmanure is an economical practice and recommended for the whole of Western Bengal.

C. Cowdung at the rate of 100 mds. (8,200 lbs.) per acre is an economical application.

2nd for Jute—A. Hooghly Deshi (Olitorius) is the best variety.

B. Castorcake at the rate of 6 mds. (492 lbs.) per acre is an economical application.

C. Cowdung at the rate of 150 mds. (5½ tons) per acre is an economical application.

3rd for Sugarcane—1st. Where manures andi rrigation can be given Mauritius (White Tanna) and Barbadoes (B147) are recommended.

2nd. Cowdung at the rate of 200 mds. (7⅓ tons) plus castorcake at the rate of 10 mds. (820 lbs.) per acre are recommended as a manurial application.

4th for Potatoes—Darjeeling variety and castorcake at the rate of 21 mds. (1,722 lbs.) per acre are economical.

Babu Chuni Lal Mustafi was in charge throughout the year. He worked well.

B. Burdwan Farm.—The season at this farm was unfavourable in May and July when drought occurred, but the Eden Canal allowed of irrigation being carried out in these months, so the recorded amounts of 1·36 and 2·54 inches instead of the normal of 5·56 and 12·32 inches, respectively, were supplemented by canal water. This enabled us to grow a good crop of jute while the heavy late rainfall in October-November of 18·55 inches against a normal of 4·57 inches in these months made the season extra favourable for rice. 73·62 inches of rain were recorded on this farm during the period April-March 1916-17 on 82 rainy days as compared with the normal rainfall (40 years) of 57·54 inches on 71½ rainy days.

For jute an outturn of 1,656 lbs. (20¼ mds.) of fibre was obtained from farm grown capsularis seed and an addition of 150 lbs. of Nitrate of Soda to an application of 150 maunds (5½ tons) of cowdung was found to be an economical practice.

The ordinary variety of jute grown in Western Bengal is Olitorius, but Capsularis has always been successful at Burdwan owing to the fact that irrigation is generally given in May and early June. Generally speaking in Western Bengal no irrigation is available at this season of the year and Olitorius jute seems to suit a late season better than Capsularis.

An average outturn of 23 maunds (1,886 lbs.) of paddy was obtained from 18 acres Dhaincha greenmanure gave an increased outturn over the unmanured plot of 8¾ maunds (718 lbs.), grain 17¾ maunds (1,454 lbs.), straw at a cost of Re. 1 for seed plus 3 ploughings and one laddering.

Three maunds (246 lbs.) bonemeal per acre gave an increased outturn of 9¾ maunds (798 lbs.), grain and 8½ maunds (696 lbs.), straw per acre over the unmanured plot at a cost of Rs. 9 per acre, while 100 maunds (8,200 lbs,) cowdung per acre gave an increased outturn of 6¾ maunds (552 lbs.), grain and 1,424 lbs. straw above the unmanured plot at a cost of Rs. 5 per acre.

Mr. Hector's Indrasail paddy was tried on one-sixth of an acre and yielded at the rate of 26¼ maunds (2,152 lbs.) per acre or 2½ maunds (204 lbs.) better than the best local variety Jatakalma. This must be attributed to the extraordinary late season of 1916. Generally speaking Nagra which is a late season and long period growing paddy cannot be grown satisfactorily on this farm so that Indrasail which is a longer period growing variety than even Nagra ought not to do so well. Further trials will be made.

Mauritius cane (White Tanna) was far superior to local Puri and Shamshara yielding 66¾ maunds (5,472 lbs.) of gur per acre as compared with 32½ maunds (2,664 lbs.) from the local varieties.

Potatoes yielded at the rate of 195½ maunds (16,030 lbs.) per acre.

Groundnuts yielded at the rate of 19½ maunds (1,598 lbs.) per acre.

Babu Jogendra Charan De was the Superintendent in charge of the farm throughout the year. He worked well.

Kalimpong.—Good work was again done on this farm during the year under review. The season was unfavourable in the beginning, but became more seasonable in the second-half of the year. Drought up to June and excessive rain afterwards briefly describes the season 1916 on this hillside. Still a good crop of maize was grown—an average outturn of 2,378 lbs. (nearly 30 maunds) per acre from 21 acres being obtained. From 10½ acres the average outturn was 2,599 lbs. (31¾ maunds) per acre while from one acre of flat white 3,054 lbs. (38⅛ maunds) were harvested.

Without heavy manuring big crops are not possible. Most of the maize on this farm is manured with 175 maunds (6½ tons) of farm yard manure. The unmanured plot yielded at the rate of 1,816 lbs. (22½ maunds) per acre as compared with 2,378 lbs (nearly 30 maunds) from 175 maunds of farm yard manure. The cost of 175 maunds (6½ tons) of farm yard manure and spreading was Rs. 13. From transplanted paddy the average outturn per acre from 14 acres was 1,439 lbs. (18 maunds) while from 2¾ acres of Touli at an elevation of 3,500—3,675 feet (above sea-level) the yield was 1,640 lbs. (20 maunds) per acre. The best yield was from Touli paddy which on one-fourth acre gave an outturn of 1,722 lbs. (21 maunds) per acre.

The unmanured plot gave an outturn of 1,199 lbs. per acre as compared with 1,322 lbs. from the greenmanured plot.

Paddy on the plains with the same facilities for growth as at Kalimpong from July to October would yield 40 maunds (3,280 lbs.) per acre, but on these hills the rain drains away so rapidly that there is generally want of water by the end of October and scarcity in November which prevents the outturn from being a maximum one.

Aus paddy thrives well on this hillside and yielded at the rate of 1,830 lbs. per acre in 1916, but it grows on maize land which is the more profitably employed by the latter crop.

Pineapples continued their success of the previous year. The crop on half an acre which was planted out as suckers in 1912 gave an outturn of 2,700 pines. The record is now—

						Rs.	A.
1916-17	...	Pines	2,700	harvested.	Expenditure ...	35	0
1915-16	...	Do.	1,002	„	„ ...	31	0
1914-15	...	Do.	497	„	„ ...	27	4
1913-14	...	Do.	54	„	„ (and 1912)	120	14

The crop is still going strong.

Peaches and plums will thrive on this hillside. It is only necessary to obtain the early ripening varieties which are already established at Monsong. Grenadillos also do well.

Vegetables grow very well on this hillside and there is no reason why a thriving vegetable cultivation should not be introduced. Cauliflowers, cabbages, carrots, parsnips, celery, kholrabi, beetroot, turnips, peas and french beans all do well.

Excellent work has been done on this farm. It is necessary now to have a district agricultural officer to bring the results already obtained home to cultivators in definite centres.

Mr. Edmunds was in charge of the farm during the year and worked with his customary zeal. I submit his detailed report below.

5. *District Demonstration Work.*—District work is limited by the staff at our disposal. We have found by experience that nearly all demonstration work without the requisite supervision is unsatisfactory. We have also found that to attempt too many things is a mistake. We are, therefore, now limiting ourselves in demonstration work to a few definite items. These are—

I.—For all the districts in Western Bengal—

(1) Dhaincha greenmanure for aman paddy.
(2) Potatoes as a new rabi crop.

II.—For the laterite areas of Birbhum, Burdwan, Bankura, Midnapur and Murshidabad—

(1) Groundnuts as a new crop.
(2) Bonemeal as a manure for aman paddy.

III.—For all the jute districts in Western Bengal—

(1) Castorcake as a manure for jute.
(2) Nitrate of Soda as a manure for jute.

IV.—For aus paddy districts—

Castorcake as a manure for aus paddy.

V.—For sugarcane tracts—

Mauritius and B 147 where irrigation and manurial facilities are available, 200 maunds (7½ tons) cowdung plus 10 maunds (820 lbs.) castorcake as a manure for cane.

6. *District Agricultural Association.*—There is an agricultural association in each of the two divisions of Western Bengal and one in each district, but only two district associations in the Burdwan Division have shown much activity. This has been due to the fact that only these two districts were provided with scientific officers. Recently a third agricultural officer has been appointed to Midnapur who will soon make the members a live body of workers.

In the Presidency Division there is only one district association, 24-Parganas, with an agricultural officer.

At first we tried to send the agricultural officer to all the associations, but we found it was impossible for him to supervise the work of every member of every association. We are now restricting his activities to one district.

From the work that has been done by each association in the past, I am convinced that when an agricultural officer has been appointed to each district, each association will become the centre for real work.

I attended where possible all association meetings. Secretaries of associations should give timely notice of their meetings to enable us to prevent clashing of dates.

7. *Burdwan Division.*—Mr. J. N. Sirkar is the Superintendent of Agriculture in charge of this division. He attends all meetings of Associations and is supposed to supervise all the demonstration work of each member, but without help he found it was impossible to carry out successful demonstrations. He now restricts himself most of the time to those districts where he has an agricultural officer. He has therefore spent most of his time during the past year in Birbhum and Bankura. Since April he is spending more time in Midnapur where an agricultural officer has been posted.

In addition to these agricultural officers, the Superintendent of Agriculture had 6 demonstrators to help him with demonstration work and up to recently he stationed 3 of them at Kalna, Paniseola (Hooghly) and Chakdighi (Burdwan), respectively. He now finds that these demonstrators require more continuous supervision than he can give and has transferred them to districts under agricultural officers where they can receive constant supervision and advice.

Besides this demonstration work the Superintendent had 13 temporary jute forecast clerks for 4 months to help him to check the jute figures of the President Panchayats in this division.

The Superintendent was on leave for one month during the year in January 1917 when I did his work. He was on tour 181 days during the period under review and spent most of his time in the villages, thanas and districts noted below showing the results of demonstration work. He also visited all subdivisions where jute grows. Mr. J. N. Sirkar did a strenuous year's work and helped me in every way. He did excellent work.

A. Birbhum.—This was the district where demonstration work was most active and successful. Babu Jogesh Chandra Roy is the agricultural officer in charge. He was on tour 241 days during the year. He is only a temporary officer, but is energetic, enthusiastic and keen on his work. From 1915 we were only able to get authentic results from about 5 bighas of groundnuts, but in 1916 B. J. Roy has obtained results from 210 bighas and probably 400 bighas will be grown under his control this year.

Bonemeal was demonstrated successfully on 230 bighas in 1915 and on 310 bighas in 1916, while probably 800 bighas will be controlled by the district agricultural officer this year.

The success of "Dhaincha greenmanure" for paddy is problematical in Birbhum and depends entirely on the season. Given a shower or two in May this will be a successful item of demonstration, but it depends entirely on the sagacity and energy of the district agricultural officer. If the opportunity for sowing is lost, this demonstration will fail. This item was successfully demonstrated on 9 bighas in 1915 and on 17 bighas in 1916 while seed sufficient for 400 bighas have been distributed this year.

Other successful items of demonstration carried out in this district in 1916-17 were potatoes and castorcake as a manure for both potatoes and sugarcane.

B. Bankura.—This was the second district where we stationed an agricultural officer, Mr. P. G. Krishnan. He has had to be given leave frequently owing to ill-health with the result that our demonstration work has suffered. He was on tour 153 days during the year. Babu S. B. Bose did his work while on leave in July-August. The results tabulated below show that Dhaincha greenmanure as well as bonemeal are economical manures for paddy for this district, while groundnuts are suited to the high land. I am indebted to the help given our department by A. W. Cook, Esq., C.I.E., District Magistrate, who encouraged us in every way. Groundnuts were demonstrated on 8 bighas in 1915, while in 1916 demonstrations were carried out successfully on 22 bighas. We hope to have 150 bighas under our control this year.

Bonemeal on paddy was demonstrated on 57 bighas in 1916, but so far the people do not seem enthusiastic about this manure.

Dhaincha greenmanure was demonstrated on 32 bighas in 1916, while seed sufficient for 400 bighas have been distributed this year.

Potatoes were also successfully demonstrated in 1916-17.

C. Midnapur.—An agricultural officer was appointed to this district on the 24th of April 1917 so there is nothing to report for 1916-17. Babu

Bhabatosh Dutt, agricultural officer, has arranged already demonstrations with groundnut, dhaincha greenmanure and bonemeal on a practical scale.

D. Burdwan.—There is no agricultural officer in this district, but it is very evident that one should be appointed at an early date. The Farm Superintendent, Burdwan, is trying to do district work in addition to his own duties, but I am afraid it is too much for him. He has arranged already this year demonstrations with bonemeal on over 300 bighas besides manurial demonstrations with castorcake.

8. *Presidency Division.*—Mr. H. P. Mittra is the Superintendent of Agriculture in charge of the Presidency Division. In 1916-17, he had only one district agricultural officer, Babu S. K. Dutt, in charge of the 24-Parganas, to help him. In addition he had 7 permanent demonstrators for district work and 5 temporary demonstrators for potatoe work. Most of the work done in this division was done in the 24-Parganas.

He had 19 temporary clerks for 4 months to help him with jute forecast work so that most of his time at the busy season of the year for agricultural work was occupied with the jute forecast.

He was on tour for 145 days in the year and attended meetings of all agricultural associations in addition to visiting all subdivisions in connection with the jute forecast. His work is handicapped by want of staff and much of his work is rendered ineffective on this account.

A. 24-Parganas.—Babu S. K. Dutt was the officer in charge of the agricultural work in this district during the year. The chief work done was demonstration of castorcake as a manure for jute, aus paddy, aman paddy and sugarcane, bonemeal as a manure for paddy, B 147 cane as a better cane than Shamshara and potatoes as a profitable crop.

I do not think bonemeal will ever become popular in the 24-Parganas, but dhaincha greenmanure should, especially in Baraset and Barrackpore subdivisions.

Sachindra Babu was on tour 162 days in the year, of which he spent 140 in the 24-Parganas for demonstration and jute forecast work, the remainder being taken up with visits to Khulna, Bagerhat, Satkhira, Jhenidah, Magura, Narail, Meherpur and Chooadanga for the jute forecast.

He worked very well and energetically.

B. Other districts.—Murshidabad, Nadia and Jessore have all live associations and only require an agricultural officer to make them active centres of demonstration work.

9. *Darjeeling.*—Now that the Kalimpong Farm has been in existence over ten years and has obtained definite results that can be demonstrated, an agricultural officer is required for district work to bring home the results to the villagers.

10. *Agricultural Exhibitions.*—Again on account of the war, through want of funds, few agricultural exhibitions were held this year in Western Bengal. The one at Suri was very good and was the means of bringing home to thousands of cultivators the value of groundnuts and potatoes as crops for this district, also the value of bonemeal, dhaincha greenmanure and castorcake as manures. Useful mêlas were also held at Chinsurah, Hitampur, Sekeddah, Serampore and Banjetia. It will soon be found that the first requisite for a really successful exhibition is an agricultural officer who will bring out the results that have been achieved in a particular district during the year.

11. *Seedstores.*—We have two seedstores in Western Bengal, one at Sealdah for the Presidency Division and the other at Howrah for the Burdwan Division. The Superintendent of Agriculture in each case has his office at the seedstore. A record is kept of everything sent out by each seedstore and a study of the balance sheets of each store as per 1st April 1917 below is very interesting :—

Burdwan Divisional Seedstore, Howrah.

	Rs.
Brought forward from 1915-16—	
Seeds	82
Stock in hand 1st April 1916—	
Manures...	555
Implements and seedbins ...	700
Total ...	1,337

Expenditure, 1916-17—	Rs.	A.	P.
Seeds	481	9	5
Manures	354	11	3
Implements	1	15	6
Contingencies	261	8	6
Rent	840	0	0
Total ...	1,939	12	8

Receipts, 1916-17—	Rs.	A.	P.
Seeds	610	12	3
Manures	1,007	9	0
Implements	187	12	0
Total ...	1,806	1	3

Stock in hand 1st April 1917—Carried forward—	Rs.
Seeds	215
Manures	140
Implements	500
Total ...	855

Potatoes, 1916-17—	Rs.	A.	P.
Expenditure	1,332	0	0
Receipts	920	8	6
Outstanding	411	7	6

Bills outstanding for 1916-17 and still to be paid—

	Rs.	A.	P.		Rs.	A.	P.
Groundnut ...	46	5	9	Since realised ...	286	2	3
Castorcake ...	397	13	9	Outstanding ...	427	9	0
Bonemeal ...	194	15	0				
Dhaincha ...	74	8	9				
Total ...	713	11	3				

Bills outstanding for 1915-16 and still to be paid—

	Rs.	A.	P.		Rs.	A.	P.
Groundnut ...	24	3	9	Castormeal	170	5	0
Castorcake ...	61	14	0	Saltpetre	4	8	6
Bonemeal ...	228	12	0	Super	16	8	9
Dhaincha ...	57	6	9	Sul of ammonia ...	25	1	3
Potatoes ...	Nil			Rahar	0	12	6
				Paddy	3	4	3
				Wheat	2	9	3
				Gram, etc.	15	0	6
				Total ...	610	6	6
				Realised up to 1st July 1917	298	12	0
					311	10	6
				GRAND TOTAL ...	1,150	11	0

Presidency Division Seedstore, Sealdah.

Stock in hand—Carried forward 1st April 1916—	Rs.	A.	P.
Seeds	19	1	9
Manures	145	14	9
Implements and seedbins ...	576	0	0
Total ...	741	0	6

Expenditure, 1916-17—	Rs.	A.	P.
Seeds	328	7	3
Manures	423	8	3
Implements	Nil		
Contingencies	987	4	3
Furniture	100	0	0
Rent	840	0	0
Total ...	2,679	3	9

	Rs.	A.	P.
Receipts, 1916-17—			
Seeds	92	2	9
Manures	862	8	0
Implements	21	8	0
Total ...	976	2	9
Realised up to 1st July 1917	199	14	0
Outstanding	460	0	0
1916-17, Potatoes—			
Receipts	1,179	5	0
Expenditure	1,839	3	0
Potatoes outstandings	659	14	0
Bills outstanding, 1916-17	418	1	3
Ditto 1915-16	651	1	0
Potato bills outstanding, 1915-16	72	0	0
Grand total of debts outstanding on 1st April 1917 ...	1,801	0	3
Stock in hand on 1st April 1917—			
Seeds	36	6	9
Manures	141	10	6
Implements	526	8	0
Total ...	704	9	3

From these figures it will be seen that the outstandings are large We hope to get co-operative credit societies to finance manures as our staff is too small to allow of them wasting their time in collecting bills. A careful examination of the work of the Presidency seedstore leads me to the view that the funds spent on this seedstore at the present time would be better employed in maintaining three district agricultural officers and abolishing the seedstore. However, the Superintendent must have an office and when three district agricultural officers are appointed a seedstore becomes a necessity. The firms in Calcutta can supply manures.

The Burdwan seedstore can be replaced by the two district seedstore (Birbhum and Bankura) already started and an extra agricultural officer can be maintained from the funds now spent on this seedstore. The Superintendent, however. must have an office.

12. *Training of Assistants.*—Arrangements have been made for training 12 apprentices at Chinsurah and Government has alloted funds for four candidates. District Boards or private persons should provide stipends each at Rs. 15 per month for one year for the remaining eight. One can be trained at Burdwan. Five apprentices were trained in 1916-17.

13. *Staff.*—The staff under my control has been noted above under the various headings and I have appraised the work of each person under his own section.

14. *Detailed Reports of Farms.*—Chinsurah, Burdwan and Kalimpong are given below.

F. SMITH,

Deputy Director of Agriculture,
Western Circle, Bengal.

REPORT ON THE WORKING OF THE CHINSURAH AGRICULTURAL STATION FOR THE YEAR 1916-17.

I.—*Introduction.*—This farm of 210 acres, the soil of which is typical of the Hooghly District in the Burdwan Division, is well suited to jute and winter paddy in years of normal rainfall. Experiments on these two crops, demonstrations of approved methods, and production of good seeds of jute and paddy and of sugarcane sets and banana shoots for the division, form the main work here. Pure line cultures of jute and paddy have progressed under the guidance of the Fibre Expert and the Economic Botanist.

II.—*Situation and brief history.*—The Farm is situated to the west of the East Indian Railway line between the Chinsurah and Hooghly stations It is only 38 inches above sea-level. The station was opened in 1908 and is representative of the Hooghly District.

III.—*Irrigation.*—The farm depends entirely on rainfall. Water storage requires more attention. Iron dons for short lifts and a bullock gear double chain pump for 10 feet lift were used so long as there was water. Trials and comparisons with water lifts cannot be made until a good storage is arranged for.

IV.—*Soil.*—The soil is mostly a clay loam and represents the Gangetic alluvium to the west of the Hooghly. It is fertile and capable of growing good crops. The following table shows the percentage figures of analysis of the soil and subsoil :—

	High land soil No. 1A, Lab. No. 144.	High land sub-soil No. 1 B, Lab. No. 145.	Block A soil (field No. 2 A), Lab. No. 146.	Block A sub-soil 2 B, Lab. No. 147.	Medium soil No. 3 A, Lab. No. 148.	Medium sub-soil No. 3 B, Lab. No. 149.	Low land soil (field No. 4 A), Lab. No. 150.	Low land sub-soil No. 4 B, Lab. No. 151.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Insoluble silicate and silica	77·25	...	71·20	...	67·00	...	63·38	...
* Combined water and organic matter.	5·29	...	5·05	...	8·33	...	9·59	...
Ferric oxide and alumina	14·77	...	20·14	...	21·48	...	22·84	...
Lime	·96	...	1·53	...	1·00	...	1·57	...
Magnesia	·31	...	·26	...	·55	...	1·75	...
Potash	·85	1·63	1·29	1·22	1·31	1·17	1·51	1·01
Soda	·55	...	·39	...	·27	...	·27	...
† Phosphoric anhydride	·12	·15	·22	·10	·06	·12	·09	·12
Total ...	100·00	...	99·98	...	100·00	...	100·00	...
* Containing nitrogen	·09	·073	·091	·088	·091	·064	·134	·122
† Containing phosphoric anhydride soluble in 1 per cent. citric acid solution.	·014	...	·016	...	·005	...	·007	...

V.—*Season and rainfall.*—The year under report was unfavourable for paddy and jute. The actual rainfall of ·47 inches only against normal 5·85 inches in May did not allow jute lands and paddy seed beds to be prepared in time. Again, the recorded fall of 4·04 inches (in 9 days), against normal of 11·28 inches, in July rendered paddy transplanting impossible, and the seedlings got out of condition. Transplanting started as late as the 24th August—the earliest date when the work was possible. The actual rainfall of 12·66 inches, against a normal 8·40 inches in September, along with a furious cyclone accompanied by a fall of 7 inches on the 21st caused great havoc to all standing crops.

The following table shows in inches the average normal rainfall and the actuals recorded on the farm during the year under report :—

Year and month.	Average normal rainfall at Sadar.	Actuals on Farm.		As compared with normal.		Remarks.
		Rainfall.	No. of rainy days.	Excess.	Deficit.	
1916.						
January ...	0·38	...	...	...	0·38	A very bad start for the year under report.
February ...	1·20	...	...	...	1·20	
March	1·58	...	...	...	1·58	
April	2·46	4·32	8	1·86	...	
May	5·85	·47	1	...	5·38	Helpless.
June	10·56	11·40	19	·84	...	
July	11·24	4·04	9	...	7·24	Hopeless.
August	11·64	15·25	20	3·61	...	Bulk in last 10 days.
September ...	8·40	12·66	16	4·26	...	A furious cyclone and 6·90 on 21st September 1916, complete havoc.
October	4·09	6·30	14	2·21	...	Waterlogged.
November ...	0·66	·46	2	...	·20	
December ...	0·19	...	...	...	0·19	
1917.						
January	0·38	...	...	...	0·38	
February	1·20	1·50	3	·30	...	
March	1·58	·50	3	...	1·08	
Total for the report year.	58·25	56·90	95	...	1·40	

VI. *Temperature.*—The table below shows the average monthly temperatures (maximum and minimum) in Fahrenheit in the open and in shade on the farm for the year :—

	Maximum.		Minimum.	Godown.	
	Solar.	Shade.	Solar.	Maximum.	Minimum.
1916.					
April	100	86	77	110	76
May	100	86	77	110	76
June	104	95	82	119	80
July	90	87	81	104	75
August	95	87	82	103	79
September ...	92	85	81	101	78
October	90	81	75	100	76
November ...	93	84	80	104	76
December	86	75	66	96	64
1917.					
January	83	69	53	93	50
February	89	77	61	95	52
March	94	83	63	104	63

VII. *Scientific work done during the year—*

1. Winter paddy—Aman dhan ... Oryza sativa.
2. Jute —Pat ... ... Corchorus.
3. Sugarcane —Akh ... ... Saccharum officinarum.

1. *Winter paddy.*—The cost of cultivation was excessive through unusual weather conditions, and the outturn was too low through very late transplanting and excessive stagnation. The condition under which paddy was transplanted will appear from a quotation from the Inspection Note of the Deputy Director on 12th August 1916—" * * there seems little likelihood of ever transplanting Aman Paddy this year."

A.—Seed selection and pure line cultures were done on 2 acres under the guidance of the Economic Botanist. Elimination of undesirable samples and the development of desirable pure lines of approved varieties will now progress and final selections will be obtained.

B.—Some nine varieties, including Dacca No. 1 of the Economic Botanist, were grown. The outturns, in general, from each may be seen below :—

Paddy Crop.	Actual figures of cultivation.			Average per acre.	
	Area in acres.	Outturn.		Outturn.	
		Grain.	Straw.	Grain.	Straw.
		lbs.	lbs.	lbs.	lbs.
Nagra	65·43	59,358	48,468	908	740
Dacca No. 1 ...	1·9	2,712	2,536	1,426	1,336
Jhingashal ...	·75	1,058	704	1,414	940
Kataribhog ...	·8	966	1,140	1,208	1,426
Badshabhog ...	1·0	828	1,188	828	1,168
Dadkhani	·92	1,046	1,292	1,138	1,406
Samudrabali ...	1·1	926	942	842	858
Hatishal	5·74	4,236	6,072	746	1,054
Sadi Samba ...	2·94	...	...	...	...

Nagra *vs.* Dacca No. 1.

Experiment varietal.	Total cost per acre.	Outturn per acre.		Value.	Remarks.
		Grain.	Straw.		
	Rs. a.	lbs.	lbs.	Rs. a.	
Series 1. One acre each.					
Nagra ...	27 7	1,036	1,006	48 12	
Dacca No. 1 ...	26 4	1,466	1,420	66 12	Tank earth was applied as manure.
Series 2. Two acres each.					
Nagra ...	79 11	1,366	1,258	63 4	The actual cost of Nagra seedlings was too high and disproportionate.
Dacca No. 1 ...	53 13	1,640	1,476	72 3	Costly manures which did not pay, made cultivation charges high.

Varietal—5 each.

Experimented Varieties.	Outturn per acre.		Remarks.
	Grain.	Straw.	
	Lbs.	Lbs.	
Nagra	1,772	1,650	
Jhingashal	1,458	1,452	
Kataribhog ...	1,432	1,738	
Badshabhog ...	1,054	1,750	
Dadkhani	1,470	2,586	Adverse weather conditions made the cost too high.
Dacca No. 1 ...	1,810	1,644	
Samudrabali ...	866	936	
Hatishal	430	644	Almost failed; low situation and bad stagnation.

The table below shows the average outturn per acre of eight different varieties of winter paddy, the first four of which are being tried for eight successive years :—

Varieties tried	Average outturn per acre.															
	1909-10.		1910-11.		1911.12.		1912-13.		1913-14.		1914-15.		1915 16.		1916-17.	
	Favourable rainfall.		Transplanting very late.		Late rains scanty.		Favourable rainfall.		Favourable rainfall.		Transplanting late, late rains deficient.		Transplanting late, season short.		Transplanting very late, late rains excessive.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	K. P. G.		
Hatishal	1,558	2,182	880	1,382	1,054	2,972	1,804	2 982	1,956	3,218	1,184	2,716	2,264	1 12 10	430	644
Nagra	2,418	2,634	738	1,322	1,598	2,438	1,762	1,998	2,562	2,798	942	3,494	1,916	2 2 6	1,772	1,670
Badshabhog ...	1,636	2,870	1,024	1,434	1,700	3,034	1,382	2,192	2,316	3,924	902	2,592	778	1 4 6	1,054	1,742
Dadkhani ...	1,618	1,968	788	1,332	1,404	2,110	1,516	1,896	2,156	2,460	614	2,552	1,044	1 7 17	1,476	2,582
Dacca No. 1 ...	...	...	...	...	...	...	...	...	...	...	1,086	3 042	1,804	1 13 16	1,804	1,640
Kataribhog ...	...	...	...	...	...	...	...	...	...	...	716	2,542	1,158	1 10 16	1,434	1,728
Samudrabali ...	...	...	...	...	...	...	...	...	...	...	942	1,198	1,332	1 14 12	870	942
Jhingashal ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,464	1,464

From the above it may now be safely concluded that Nagra holds its own in favourable years; Hatishal and Badshabhog do best with deficient late rains; and Dacca No. 1, suits best in excessive rainfall. When pure line seeds of Nagra, Hatishal and Badshabhog are obtained, better results may be expected.

C. Manurial.—The series of manurial experiments and demonstrations failed through too late transplanting and the lands getting submerged in

water in September. The table below speaks for itself and corroborates the utility of Dhaincha greenmanuring for aman paddy :—

I.

Manures per acre.	Average outturn per acre.										Remarks.
	1912-13.		1913-14.		1914-15.		1915-16.		1916-17.		
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
Unmanured	1,742	2,448	2,008	2,664	1,158	2,090	1,516	1,906	972	942	Dhaincha beat cowdung in four cases out of 5, and unmanured by an average of about 7 maunds (574 lbs.) per acre.
Cowdung 100 maunds (8,200 lbs.)	1,894	3,074	2,674	3,596	1,372	2,336	2,008	2,192	1,178	1,250	
Dhaincha greenmanure	2,390	3,812	2,408	2,808	1,496	2,766	2,398	2,992	1,362	1,434	

II.

Manures per acre.	Cost of manure per acre.	Outturn per acre	
		Quantity.	
		Grain.	Straw.
	Rs. A.	lbs.	lbs.
1. Unmanured	..	976	938
2. Cowdung 100 maunds (8,200 lbs.) ...	7 12	1,176	1,248
3. Dhaincha green manured	1 15	1,356	1,436
4. Bonemeal ... 3 maunds (246 lbs.) ...	10 2	1,072	1,066
5. Cowdung ... 50 „ (4,100 lbs.)... / Amm. sulphate 1 maund (82 lbs.) ...	10 9	942	904
6. Cowdung ... 50 maunds (4,100 lbs.) ... / Sodium nitrate ... 1 maund (82 lbs.) ...	17 4	828	848
7. Castorcake ... (492 lbs.) ...	17 5	1,254	2,050
8. Cowdung ... 50 6 maunds (4,100 lbs.) / Super ... 3 „ (246 „) / Amm. sulphate .. 1 „ (82 „)	24 15	1,018	1,114
9. Cowdung ... 50 „ (4,100 „) / Super ... 3 „ (246 „) / Sodium nitrate ... 1 maund (82 „)	26 0	1,002	922
10. Dhaincha greenmanured ... / Sodium nitrate ... 1 maund (82 lbs.)	12 14	1,544	1,752
11. Bonemeal ... 3 maunds (246 „) / Sodium nitrate ... 1 maund (82 „)	18 4	990	962

It has been experienced that artificial manures are of uncertain efficacy specially for winter paddy, as a heavy downpour after application may wash them out. While general manures, *e.g.*, cowdung or Dhaincha green manure, are always sure, and, of them, Dhaincha is the manure strongly recommended for extensive adoption.

D. Method.—The ultimate financial results from sowing seedbeds at different rates may be seen from the following table :—

Seedbed rate per bigha.	Outturn per acre. Quantity.	
	Grain.	Straw.
lbs.	lbs.	lbs.
40	1,824	1,140
60	2,600	1,978
80	1,918	1,338
160	1,138	1,160

Good strong seedlings will be obtained quickly by thin sowing and will ensure the best harvest and a seed bed-rate of 120 to 180 lbs. per acre is recommended for Nagra paddy.

2. *Jute.*—A seed selection by pure lines, mostly of recognised olitorius varieties, progressed steadily under the guidance of the Fibre Expert, and desired samples selected for next year's trial and propagation were obtained.

B. A number of varieties were grown, for fibre or seed, and the table below will show the respective areas and outturns under each :—

Jute Crop.	Area in acres.	Actual figures of cultivation.			Average per acre.	
		Outturn.		Total value.	Outturn.	
		Fibre.	Seed.		Fibre.	Seed.
		lbs.	lbs.	Rs. A.	lbs.	lbs.
Hooghly Deshi ...	21·56	15,258	32	1,673 7	706	32
Rajshahi Tosha ...	2·0	2,060	...	226 1	1,028	...
Pabna „ ...	6·4	2,876	144	351 4	448	22
Kakya Bombai, No. 7	·2	260	...	28 11	1,304	...
Olitorius varieties for seed.	3·37	1,372	156	189 0	406	46

The conditions under which jute was sown will be clear from a quotation from the Inspection Note of the Deputy Director on 8th June 1916. "This month the rain has allowed the land to be prepared and sowing is taking place to-day."

The following table will show the results from some jute varieties :—

Actual area.	Varieties.	Outturn per acre.
		Fibre.
		lbs.
Series 1—		
1·0	Hooghly Deshi	1,010
1·0	Rajshahi Tosha	1,036
Series 2—		
·4	Hooghly Deshi	1,290
·2	Kakya Bombai, No. 7	1,304
·4	Pabna Tosha	682

C. Manurial.—No application, except cowdung 150 maunds (5½ tons) per acre, repaid the expenditure through heavy downpours washing out the manures applied.

D. Method.—Harvesting at different stages—in flower, pods half formed and seeds ripe—was continued. The results, though very poor, corroborate the previous recommendation, viz., to harvest jute when pods are only half formed.

3. *Sugarcane.*—There was absolutely no rainfall from January to March 1916, and consequently the charges of the cultivation were abnormally

heavy. Each drop of water on the farm had to be collected and lifted, but still full germination could not be secured. Further on, the cyclone of September made a complete havoc, rooting out and laying down the plants which remained hopelessly lodged and battered. Still, the following table of results will show the varieties tried and their respective merits as based on actual figures obtained :—

Varieties.		Outturn per acre.		Remarks.
		Gur.	Sets.	
		lbs.	No.	
Series 1—				
¼ acre each	Yellow Tanna ...	8,592	16,500	A practical all-round cane that stood the cyclone gallantly.
	Barbadoes ... 147	6,674	17,500	Fairly hardy, but snaps readily.
	Ditto ... 208	3,556	8,500	Very rich, but most delicate and susceptible to diseases and pests.
Series 2—				
$\frac{1}{20}$ acre each	Yellow Tanna ...	7,890	18,000	Very hardy, immune from pests, a thick, hard tall giant cane with heavy outturn. Very suitable for gur crop.
	Red Mauritius	6,244	20,000	Seems possible to improve further when acclimatised.
	Barbadoes 3,412	5,976	20,000	Ditto ditto.
	Ditto ... 208	5,578	10,000	Is not a practical yielder here though containing the highest percentage of gur in cane and yielding gur of first rate quality and crystals.
	Ditto ... 147	5,430	19,000	A fairly good variety, except for its snapping so easily.
	Striped Tanna	4,006	15,000	A showy cane, but cannot stand competition.
	Shamsara ...	3,892	12,000	Its days are counted as it can stand competition no longer.
	Dacca Gandari	3,436	12,000	A thick, soft, fairly rich cane, but cannot stand competition.
	Punri ...	3,104	1,400	Always fares worst here.

Up to date, we can safely recommend Yellow Tanna of Mauritius as a gur cane. For a chewing variety or a cane for first class gur grow B 208. B 147, Red Mauritius B 3412 are recommended.

4. *Bananas.*—Great damage was done by a cyclone. None of the Dacca Rampal varieties, except Savari (allied to local Martaman) seem to do well here. Suckers are being obtained for supply.

VIII. *Distribution of seeds, etc.*—The following seeds, etc., were supplied during the year from the farm :—

	lbs.
Jute—	
Pabna Tosha	405
Hooghly Deshi	21
Kakya Bombai, No. 7	13
Paddy—	
Nagra	497
Jhingashal	82
Dacca, No. 1	189
Hatishal	296
Badshabhog	830
Samudrabali	313
Kataribhog	574
Dadkhani	205

	lbs.
Pulses—	
Arhar	10
Gram	82
Khesari	82

	No.
Sugarcane—	
Sets of varieties	31,825

Poultry—	
Black Langshan cock	3
Ditto hen	2

	lbs.
Manures—	
Dhaincha seed	829
Ammonia sulphate	52

The demand for seed from the farm is increasing steadily.

IX. *Practical training of young men.*—Four young men, of the cultivator class, received practical training on the farm during the year on an allowance of Rs. 15 each per month and free quarters.

X. *Visitors.*—It is gratifying to note that the number of interested visitors increased appreciably during the year. All enquiries on agricultural matters were duly satisfied and instructions furnished. The farm exhibits attended the Hooghly Exhibition in February 1917.

The District Collector, Mr. F. B. Bradley-Birt, I.C.S., took a great interest in the farm.

XI. *Receipts and Expenditure—*

	Rs.	A.	P.
Receipts ...	7,231	13	0

Expenditure—	Rs.	A.	P.
Purchase of cattle ...	2,170	11	6
Ditto seed and manures	1,832	13	9
Wages of farm labourers ...	9,948	9	10
Miscellaneous	1,911	15	6
Medical aid	235	13	3
Total ...	16,099	15	10

XII. *Management and Inspection.*—I was in immediate charge of the farm during the year. My three Overseers gave me faithful assistance. The Clerk, Babu Surja Kumar Nandy, was confirmed in his appointment during the year. He is an energetic and willing worker.

The Deputy Director made frequent inspections throughout the year. The Fibre Expert visited the farm six times and the Director of Agriculture, Bengal, visited four times.

C. L. MUSTAFI,
Superintendent.

ANNUAL REPORT OF THE AGRICULTURAL STATION, BURDWAN, FOR THE YEAR ENDING 30th JUNE 1917.

This Agricultural Station stands three miles south-east of the Civil Station of Burdwan. It was opened in the year 1885 and carried out experimental work till the year 1911 when both demonstration and experimental work were taken up.

Area.—Area of this farm is 32 acres.

Soil.—Soil of the farm is a poor sandy loam. The site was originally a piece of waste land overgrown with jungles of Kesha and Bana grass. The

following table gives the analysis of average samples of soil and sub-soil of the whole farm :—

	Soil, 1st 9 inches.	Sub-soil, 2nd 9 inches.
Insoluble silicate and sand	88·52	88·47
Ferri oxide	3·60	3·68
Alumina	4·42	5·27
Lime	·34	·33
Magnesia	·34	·31
Soda	·09	·07
* Potash	·31	·32
† Phosphoric acid	·02	·03
Sulphuric acid	·01	·01
Carbonic acid	·04	·06
Organic matter and combined water ...	2·31	2·45
	100·00	100·00
* Available potash	·04	·02
† Do. phosphoric acid	·002	·001
Nitrogen	·011	·007

The above figures denote that the land is exceedingly poor in Nitrogen and Phosphoric acid, but possibly contains enough potash.

Irrigation and Drainage.—This farm is irrigated from the Eden Canal running alongside it. Part of the area about 20 acres can occasionally be irrigated by flow during the rainy season—provided the main Damodar River is fed by flood. For the rest of the season the lands are irrigated by three or more lifts. Consequently irrigation operations become very costly and farm crops suffer often from want of water. The farm is well drained when the canal is low.

Meteorology.—The following table gives the normal rainfall at the Burdwan Civil Station and the actual rainfall recorded on this farm during the period under report :—

Name of months.	1916-17.		Normal of 40 years.	
	Actual rainfall in inches.	Actual number of days.	Rainfall in inches.	Number of days (rainy).
1916.				
March	.....	.....	.....	.....
April	2·48	4	2·20	3
May	1·36	2	5·56	6
June	12·22	11	10·17	12
July	2·54	7	12·32	15½
August	21·42	25	11·49	15
September	14·29	13	8·59	11
October	11·92	13	3·93	4
November	6·63	5	0·64	¾
December	.....	.....	0·13	¼
1917.				
January	.....	.....	0·38	¾
February	·77	2	0·89	1½
March	.....	.....	1·24	1¾
Total ...	73·63	82	57·54	71½

Scanty rainfall in May caused delay in the sowing of jute which also suffered in June from heavy rainfall.

The year was very favourable for paddy and sugarcane.

Sowing of potatoes was delayed by heavy rain, while groundnuts suffered from excessive wetness—the crop being attacked by a fungus—Rhizoctonia silani.

Operations of the year.—The following are the main lines of work.—

(1) Investigation.
(2) Conservation of cowdung.
(3) Distribution of seeds.
(4) Local cultivators, demonstration works.

(1) Investigations dealing with the following crops were taken up during the year under report :—

A. Paddy.
B. Jute.
C. Sugarcane.
D. Potatoes.
E. Groundnuts.

A. Paddy—Manures on Paddy.—This is the chief work carried out at this farm. The following table details the different manures used, quantity applied, yields obtained, areas and cost :—

Serial No.	Manures.	Area in acres.	Cost of manure per acre.	Outturn per acre in lbs.
			Rs.	
1	Greenmanure with Dhaincha	2·92	1	Gr. 1,992 St. 3,402
2	Greenmanure with Dhaincha and bonemeal, 3 mds. per acre.	2·99	10	Gr. 2,140 St. 3,336
3	Bonemeal, 3 mds. per acre.	1·93	9	Gr. 2,070 St. 2,644
4	Cowdung	4	5	Gr. 1,818 St. 3,390
5	Unmanured	1·2	Nil	Gr. 1,272 St. 1,942

The following test was made on paddy with salt manures applied as top dressing in September.

The following table gives the results :—

Plot No.	Area in acre.	Manures.	Actual outturn in lbs.	Outturn per acre in lbs.
A. 4 ...	·25	Sulph. of soda, 5 lbs.	360 540	Gr. 1,440 St. *2,160
B. 5 ...	·49	Nil	706 1,070	Gr. 1,414 St. 2,040
C. 6 ...	·49	Nitrate of soda, 78 lbs. per acre	772 1,270	Gr. 1,544 St. 2,540
D. 15 ...	·65	Sulphate of ammonia, 78 lbs. per acre ...	1,036 1,568	Gr. †1,648 St. 2,546

* Local System Khari Nimak.

† This is the best plot in the farm (Godown plot) south-east corner of office bungalow.

N. B.—Sulphate of soda was applied when the plot was full of water as is the practice among the cultivators. This has been compared with nitrate of soda and sulphate of ammonia.

6. *Variety.*—The following tests were made with a few varieties of paddy seeds sent by Mr. Hector, the Botanist to the Government of Bengal, and with farm seeds :—

Varieties.	Name of varieties.	Area in acres.	Actual outturn in lbs.		Outturn per acre in lbs.	
			Grain.	Straw.	Grain.	Straw.
	Botanist's varieties—					
Econ. Botanists	1. Indrasail ...	1/6	359⅔	590⅓	2,158	3,542
Econ. Botanists	2. Satia	1/6	352⅓	578	2,114	3,468
Econ. Botanists	3. Dangalsira ...	1/6	327⅙	576	1,963	3,456
Local	4. Jatakalma ...	1/6	323⅔	582	1,942	3,492
Econ. Botanists	5. Jhingasail ...	1/6	311⅓	557⅓	1,868	3,344
Econ. Botanists	6. Kankurjali ...	1/6	265⅓	543	1,592	3,258
Econ. Botanists	7. Rajmugi (local paddy).	1/6	299	533	1,794	3,198
Econ. Botanists	8. Gobindabhog ...	1/6	297	524⅔	1,782	3,148
Econ. Botanists	9. Dadkhani ...	1/6	297	528⅔	1,782	3,172
	Botanist's seeds—					
Local	10. Amjuri ...	1/6	295½	533	1,773	3,198
Local	11. Khamman ...	1/6	292	543	1,752	3,258
Local	12. Karticsal ...	1/6	278⅓	512⅓	1,669	3,074

N. B.—Excepting the items Nos. 4 and 12, all other varieties were harvested late in December.

The above figures show that Indrasail and Satia gave a higher yield than the local variety Jatakalma. The rainfall recorded during the period under report from June to November was 22 inches above the normal.

Method.—Rotation of crop.—Paddy in rotation with jute in the same year. During the period under report an outturn of 1,558 lbs. of grain and 2,419 lbs. of straw was obtained per acre after a crop of 1,414 lbs. of jute fibre. In a year of heavy rainfall like 1916 this rotation is followed by transplantation of paddy within a week's time.

B. Jute.—A manurial test was made on jute with Nitrate of soda. The following result was obtained :—

	Manure per bigha (⅓ acre).		Outturn.
Plot No. A.—Cowdung ...	4,100 lbs.	costing Rs. 6-4.	553½ lbs. fibre.
NaNO 3 ...	50 „		
Plot No. B.—Cowdung ...	4,100 „		410 „

143½ lbs. at Rs. 8 per maund of 82 lbs. and showing a profit of Rs. 7-12 per bigha or Rs. 23-4 per acre.

C.—Sugarcane.—A varietal demonstration was made with the following varieties :—

White Tanna (Mauritius)
vs.
Punri and Samsara (Local).

The result of the past few years has proved that Mauritius cane is suitable for this farm. It is also interesting to note that the heavy storm in November 1916 did not affect the Mauritius variety to the same extent as the local varieties amongst which many canes lodged.

The following yields of gur were obtained from each variety :—

White tanna ...	... 5,416 lbs.	per acre.
Local canes ...	... 2,626 „	

The following is a test made with Nitrate of soda :—

(1) Plot No. A—Nitrate of soda ... 5,092 lbs. per acre.
Ditto B— Nil ... 4,206 „ „
At Rs. 7-4=Rs. 78-5
Deducting „ 25-0 cost of NaNO 3.
Net profit „ 53-5 per acre.

	Manure per acre	Outturn per acre.
(2) Plot No. C.—Castorcake	... 656 lbs.	5,478 lbs.
NaNO 3	... 200 „	
Ditto D.— Nil	... .	4,224 „
		1,254 „

At Rs. 7-4 per maund of 82 lbs. Rs. 112·9
Deducting ... ... „ 47-0 cost of manures.

Net profit of ... ... „ 65-9 per acre.

D. *Potatoes.*—The following manurial test was made with imported Darjeeling potatoes.

	Manure per acre.	Outturn per acre.	Cost of manure per acre.
		Tons. Cwt.	Rs.
1.	Castorcake ... 1,640 lbs.	... 6 16½	55
2.	Castorcake ... 820 „	... 7 3½	50
	NaNO3 ... 200 „		
	Total ...	... 0 7¼	–5

The manure commonly used by growers is 20 to 30 maunds (1,640 to 2,460 lbs.) of castorcake per acre. This shows that half the castorcake may well be replaced with 200 lbs. Nitrate of soda.

E. Groundnuts.—Groundnuts were grown on an acre of land to demonstrate the method of growing and to show the outturn of nuts to the cultivators. Although affected by Rhizoctonia the crop yielded 1,598 lbs. per acre.

(2) Conservation of cowdung—

Cowdung is kept in a water-tight pit covered with a thatched roof.

(3) Distribution of seeds—

The following seeds were supplied to the cultivators during the period under report:—

Paddy—

Jatakalma	410 lbs.

Jute—

C. Capsularis	20 lbs.
C. Olitorius	20 „

Sugarcane cuttings—

White tanna	19,500 sets.
Groundnut	1,064 lbs.

Orders for seeds receive prompt attention. Germination tests of seeds are taken before despatch.

(4) Local cultivator's demonstration works—

The following are the results of the demonstration works undertaken by neighbouring cultivators in their own areas:—

(1) Babu Gopal Chandra Dutt of Bantir—

		Area under manure.	Average yield per acre.
		Acres.	lbs.
A. Paddy ...	(*a*) Greenmanure with Dhaincha	... 3⅓	3,398
	(*b*) Castorcake, 492 lbs. per acre	... 8⅓	2,460
	(*c*) Cowdung, 4,920 lbs. per acre	... 26⅔	2,624
	vs. Nil	... ...	1,722
			lbs.
B. Potatoes	(*a*) Local manuring — 7½ tons cowdung ... 2,460 lbs. castorcake	... ...	11,070
	(*b*) 7½ tons cowdung ... 1,722 lbs. castorcake ...	... ...	10,250

	Rs.	A.
N. B.—Price of 820 lbs. of potatoes	12	8
Price of 738 lbs. castorcake	27	0

		Acres.	Average outturn per acre. lbs.
C. Sugarcane	White tanna	1⅓	6,150
	Local canes	⅔	3,444

Trench and furrow system proved better than local system, viz., planting in plough furrows 9 inches apart—manures applied—

7⅓ tons cowdung } per acre.
738 lbs. castorcake }

(2) Babu Abani Paul of Hatisimul—

		lbs.
A. Paddy	(*a*) Bonemeal 246 lbs. per acre—1⅔ acres ...	2,296
	(*b*) Greenmanuring dhaincha—2⅔ acres ...	2,255
	(*c*) Pitted cowdung 1⅓ acres	2,378
	nil	1,804

(3) Babu Sajani Kanta Haldar—

A. Paddy—Greenmanure with dhaincha		2,275
nil		2,050

(4) Shaikh Rangu—

Bonemeal 246 lbs. per acre—⅓ acre		2,275
nil ⅓ ,, ...		1,814

(5) Hem Bagdi—

Bonemeal 246 lbs. per acre—⅓ acre		2,120
nil ⅓ ,, ...		1,845

Training.—One apprentice was trained at this farm during the year.

Management.—The expenses of the farm are borne by the Hon'ble Maharajadhiraj Bahadur of Burdwan to whom the thanks of the public are due. The entire management is in the hands of the department.

The Deputy Director of Agriculture, Bengal, made frequent inspections. The Director visited the farm during the period under report.

J. C. DE,
Superintendent, Burdwan Farm.

APPENDIX A.

Farm Account—Agricultural Station, Burdwan, 1916-17.

	Rs.	A.	P.
Receipt—			
As opening balance ...	687	3	6
As Raj contribution ...	2,500	0	0
As deposited on sale-proceeds	2,528	7	3
Total ...	5,715	10	9

	Rs.	A.	P.
Expenditure as—			
Farm expenses ...	5,409	10	0
Balance on 31st March 1917	306	0	9
Total ...	5,715	10	9

	Rs.	A.	P.
Receipts—			
Deposited—			
As sale-proceeds ...	2,528	7	3
Bills receivable ...	151	9	0
Stock in hand ...	175	0	0
	2,855	0	3
	2,818	4	0
Total ...	5,673	4	3

	Rs.	A.	P.	Rs.	A.	P.
Expenditure—						
Establishment ...				615	11	6
Capital				58	0	0
Constructions and repairs				150	10	6
Implements				92	3	6
Extra labour ...	3,610	14	3			
Cattle food ...	91	14	0			
Contingencies ...	200	2	9			
Seeds ...	143	12	0			
Manures ...	365	0	0			
Rent-rate and taxes ...	62	4	6			
Office expenses ...	11	1	0			
Postage ...	8	0	0			
				4,493	0	6
				5,409	10	0
Bills receivable ...				263	10	3
Total ...				5,673	4	3

ANNUAL REPORT OF THE DEMONSTRATION FARM, ST. ANDREW'S COLONIAL HOMES, KALIMPONG, FOR THE YEAR 1916-17.

Situation and History.—The village of Kalimpong is the head-quarters of the subdivision of Daling (a Government Estate of 401 square miles). The district was ceded to the British Government after the Bhutanese War of 1864-65. The settlement of the estate restricts the ownership of land to hill tribes, and at the same time makes provisions by which Lepchas and Bhutias are only allowed to dispose of their land amongst themselves. This condition was introduced to prevent the more thrifty and enterprising Nepalese from becoming possessors of all the land in the district, which would to a great extent have been the case, had no steps been taken to prevent it.

All transfers go through the khas mahal office, and an annual ground-rent of annas 6 to Re. 1-4 per acre is charged by Government.

Kalimpong has a fairly large bazar, and is the mart for produce of a considerably large area in addition to which it is the centre of Tibetan trade with Bengal.

It is only 11 miles by road from the nearest Railway station, Kalimpong Road, a station on the Siliguri Tista Valley Extension, Darjeeling-Himalayan Railway.

The Demonstration Farm is situated below the bazar on the easterly slope which runs down to the Rilli river a tributary of the Tista, joining the latter at Riang.

Although about 24 acres of land had been cultivated by the Homes prior to April 1907, the remaining portion was not taken over from the native cultivators until December of that year; so it was not till the beginning of 1908 that a proper start was made.

During the first two years much of the time was spent in preparatory works, such as erection of farm buildings, boundary pillars, fencing and convenient roads. A few experiments, however, were carried out with various crops.

2. *Area, Elevation.*—A survey of the farm was completed in April 1911 at a cost of Rs. 136-0-6. The plots were all numbered and the area computed. The total area, exclusive of Jhoras, is 66·92 acres, of which 9·75 are occupied with roads, houses, farm buildings, waste grounds, and under trees and bamboos leaving 57·17 acres for cultivation. During the year under report 29·50 acres were under experimental cultivation, the remainder being partly cultivated under ordinary crops and partly given to coolies on half crops system.

The elevation is as follows:—

	Feet.
Lower boundary	3,317
Farm buildings	3,673
Upper boundary	3,864

The level section through the farm from top to bottom shows an average gradient of 1 to 5. This is a very moderate slope for these hills and gives a situation difficult to improve on for experimental work.

3. *Irrigation.*—The only irrigation necessary for the rice crop is obtained from the natural rainfall, and this consists of turning water out of the many streams on to the rice terraces when required. In the winter no irrigation is possible, but few crops grow at that season. For vegetable and fruit culture during the winter and dry season it will be necessary to irrigate through pipes from the two springs around which pucca stone vats have been built.

4. *Character of the soil.*—The soil is a rich clay loam, whose reaction is acid.

5. *Meteorology.*—The following table shows the normal rainfall for 8 years, and that of 1916 at the Demonstration Farm :—

Month.	Normal 8 years.		1916.	
	Rainfall.	Rainy days.	Rainfall.	Rainy days.
1916.	Inches.		Inches.	
January	·33	1·04	·33	3
February	1·05	3·06	·92	2
March	1·81	5·02	1·10	1
April	2·54	11·02	3·22	15
May	5·54	17·01	2·57	13
June	21·34	14·05	27·96	23
July	25·87	26·05	16·42	25
August	21·96	25·02	20·97	25
September	10·76	17·05	21·04	17
October	3·42	7·0	2·68	8
November	1·61	2·07	Nil	Nil
December	·47	1·07	·41	1
Total ...	96·70	129·46	97·62	133
1917.				
January	·01	1		
February	1·37	6		
March	·58	2		

The season 1916-17 was very dry up to June and very wet afterwards, with excessive rain in June and September, consequently the maize and aus paddy crops suffered in growth during the earlier stage, although the final outturn was satisfactory, while the excessive rain in June and September did a great deal of damage to the maize crop as at the time of harvesting there was a very great percentage of mildewed and rotten cobs; also when the whole crop was being shelled. For the rice, marwa, soybeans and other secondary crops the season was favourable.

6. *Operations during the year. A. General crops grown.*—The following table gives the area under each crop grown by the farm and on the half crop system, with the total outturn, yield per acre, price per maund (82 lbs.) and total value of crops and cost of cultivation :—

Crop.	Area in acres.	Outturn in lbs.	Yield per acre.	Cost of cultivation per acre.	Price per maund of 82 lbs.	Total value of crop.	Grand Total.
		lbs.	lbs.	Rs. A.	Rs. A.	Rs. A. P.	Rs. A. P.
Maize ...	21·0	49,938	2,378	37 0	2 12	1,674 12 0	1,894 12 0
½ Crop maize ...	8·0	6,560	820	Nil	2 12	220 0 0	
Paddy (aman) ...	14·0	20,151	1,439	43 0	3 0	737 4 0	974 1 6
„ straw ...	14·0	30,719	2,193	Nil	0 9	210 11 6	
½ Crop paddy ...	0·62	549	885	Nil	3 0	20 1 0	
½ „ straw ...	0·62	717	1,156	Nil	0 9	6 1 0	
Kodo (marwa) ...	4·50	7,380	1,640	46 0	2 12	247 8 0	446 14 0
½ Crop kodo ...	7·25	5,945	740	Nil	2 12	199 6 0	
Ghaiyal (or aus paddy).	·75	1,373	1,830	50 0	3 0	50 4 0	
Ghaiyal straw ...	·75	6,560	8,745	Nil	0 2	10 0 0	60 4 0
Buckwheat ...	1·25	820	656	13 0	2 12	27 8 0	
Bhatmas (soy-beans),	7·0	5,223	746	23 8	3 2	199 1 0	
Dal Kalai ...	2·75	1,045	379	24 0	5 8	70 2 0	
Sugarcane gur	·50	1,496	2,993	142 0	10 0	182 8 0	
Gahat ...	1·0	840	840	25 0	2 8	25 10 0	
Mashyem ...	1·45	984	676	23 8	3 2	37 8 0	
Fruit culture ...	6·50	.....	.....	35 0	...	809 11 3	
Vegetable culture	2·0	.....	.....	150 0	...	468 5 3	

From the above figures it is evident that maize and kodo in rotation are the most economical crops for these hill sides. Kodo, buckwheat, soybeans, kalai and other pulses are grown after maize on the same land in the one year, but none of the latter named crops are so popular as kodo. Ghaiya or aus paddy also does remarkably well on very open slopes on these hills when sown in rows. Aman paddy can also be cultivated on a profitable scale, if sufficient care is taken to see that irrigation is kept up constantly from the jhoras till the second week of October. It is also profitable to grow this on the half crop system and it compares very favourably with maize and kodo; as regards growing pulses, buckwheat, etc., on half crop system it has been found to be disadvantageous as the returns are extremely poor.

B. Experimental work—

Primary ...	...	1. Maize.
		2. Winter paddy (aman paddy).
Secondary	...	3. Autumn paddy (aus paddy).
		4. Kodo.
		5. Buckwheat.
		6. Soybeans and dals.
		7. Miscellaneous.

B (1). Zea Mays—maize—makai--bhutta.—In 1907-08 experiments were commenced with a view to improve the crops as grown in this district, and also to compare it with Jaunpur maize. The latter after two years' trial with poor results was discontinued. Attention was then concentrated on the improvement of the local varieties by means of seed selection

The maize at the commencement was of a very mixed nature, containing seeds of all colours and required seed to seed selection. The first few years' trials, however, separated the crops into several varieties, and by the subsequent selection of the best cobs of each type we have obtained five varieties fairly true to type, *i.e.*, yellow round, yellow flat, white round, white flat and red round.

The average outturn of maize on 10½ acres of all varieties under experimental cultivation for the last few years is here given :—

	Mds.	Srs.		lbs.
1909-10	21	21	or	1,764
1910-11	27	25	„	2,264
1911-12	30	9	„	2,478
1912-13	33	8	„	2,722
1913-14	30	30	„	2,767
1914-15	30	39	„	2,539
1915-16	31	36	„	2,615
1916-17	31	28	„	2,599

These are remarkable figures and a striking illustration of the benefit to be derived from careful selection and preservation of seeds.

Seed was sown at the rate of 40 lbs. per acre between the third and fourth weeks of March and manure applied at the rate of 175 maunds or 14,350 lbs. per acre. The crop was harvested from the beginning of the second week to the end of August. The proportion of grain to cobs with leaves attached was 51·75 per cent.

(*a*) *Varieties.*—The variety experiment has given the following results :—

Variety.		Outturn.							
		1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.
Yellow round	Mds.	19¼	29½	33¼	37	37¼	33¾	33⅛	29⅛
	Lbs.	1,528	2,419	2,726	3,034	3,054	2,767	2,757	2,388
„ flat	Mds.	37¼	36¼	36	31	26¾	22	29	30⅛
	Lbs.	3,054	2,972	2,952	2,542	2,203	1,804	2,378	2,490
White round	Mds.	26¼	32¾	33¼	29	33¼	37	35½	33⅛
	Lbs.	2,152	2,685	2,726	2,378	2,726	3,034	2,911	2,777
„ flat	Mds.	28¼	35½	29¾	41½	35	31¼	23¾	37¼
	Lbs.	2,316	2.951	2,439	3,403	2,870	2,562	1,947	3,054
Red round	Mds.	19¾	30¼	31¼	37	30½	30½	36	32⅛
	Lbs.	1,619	2,480	2,562	3,034	2,501	3,023	3,023	2,634
Sutton's giant	...	...	...	...	...	...	...	...	10¾
		...	...	...	...	...	...	...	881

These figures are from one acre blocks, and the figures backed up by the average from the farm require no comment. The red variety Sutton's giant has not had a fair trial this year, having been sown a month and a half late.

(*b*) *Effects of terracing.*—To compare the result of growing ordinary crops (not irrigated paddy) on terraced and unterraced land two acres were selected as uniform in fertility and slope as was possible to find on the farm. One acre was terraced at a cost of Rs. 107-5-6. Each plot received similar treatment, equal amounts of manure and seeds being applied.

The following table shows the outturn and cost of production of maize and secondary crops for the last six years :—

TERRACED ACRE.			UNTERRACED ACRE.		
Crop.	Outturn.	Cost of cultivation.	Crop.	Outturn.	Cost of cultivation.
1911-12.	lbs.	Rs. A. P.	1911-12.	lbs.	Rs. A. P.
Maize ...	2,706	40 1 3	Maize ...	3,181	41 11 0
Soybeans—			Soybeans—		
Grain ...	973	20 8 6	Grain ...	783	24 4 0
Straw ...	1,271		Straw ...	1,004	
1912-13.			1912-13.		
Maize ...	2,701	44 14 6	Maize ...	2,956	44 14 6
Kodo—			Kodo—		
Grain ...	1,824	49 6 3	Grain ...	2,009	52 15 3
Straw ...	Estimated Rs. 5.		Straw ...	Estimated Rs. 5.	
1913-14.			1913-14.		
Maize ...	2,460	37 10 0	Maize ...	2,911	37 10 0
Kalai dal—			Kalai dal—		
Grain ...	410	25 0 0	Grain ...	389	25 0 0
Straw ...	553		Straw ...	410	
1914-15.			1914-15.		
Maize— ...	2,566	37 9 0	Maize ...	2,933	38 1 0
Buckwheat (local).	358	14 9 0	Buckwheat (local).	369	14 9 0
1915-16.			1915-16.		
Maize ...	2,829	33 5 0	Maize ...	3,308	33 8 0
Soybeans—			Soybeans—		
Grain ...	410	22 8 0	Grain ...	287	22 0 0
Straw ...	912		Straw ...	676	
1916-17.			1916-17.		
Maize ...	2,675	36 0 0	Maize ...	2,798	36 8 0
Kodo—			Kodo—		
Grain ...	1,886	46 0 0	Grain ...	1,732	46 0 0
Straw ...	Estimated Rs. 5.		Straw ...	Estimated Rs. 5.	

During the six years of experiments, maize has been grown on these plots in rotation with soybeans, kodo, kalai dal and local buckwheat as secondary crops. So far the outturn of maize has been higher on the unterraced area.

It is interesting to note that the secondary crops, soybeans, kalai dal (pulses) gave higher yields on the terraced area, while kodo and buckwheat (cereals) gave a greater yield on the unterraced area, except for kodo which

yielded better results on the terraced area this year under report. After careful observations we find many disadvantages and irregularity in these two areas not quite favourable to our experiments and until these are removed we are not in a position to pronounce which of the two areas are recommendable for these hill sides.

(*c*) *Manurial experiment.*—Three plots of ½ acre each have been reserved for this experiment since 1910-11. The condition of the soil in each plot is fairly uniform, and the situation of each plot is approximately at the same level.

The following results were obtained in 1916-17 with maize and soybeans in rotation :—

½ acre plots.	Manure per acre.	Outturn of maize per acre.	Outturn of soybeans per acre.
		lbs.	lbs.
1.	8,200 lbs. farm yard manure and 164 lbs. superphosphate	2,439	861
2.	8,200 lbs. farm yeard manure ...	2,378	820
3.	Unmanured	1,816	656

To test the value of Nitrate of soda the following manurial experiment was undertaken with the results given below :—

	lbs.	lbs.
1 acre plot, 24,600 lbs. of farm yard manure	2,654 maize.	1,660 kodo.
1 acre plot, 12,300 lbs. of farm yard manure plus 100 lbs. of Nitrate of soda ...	2,511	1,814

Since these manurial experiments have been carried out on the farm it has been proved that the application of farm yard manure alone is more economical and effective than artificial, the rainfall being so great at times that these artificial manures never seem to get any chance of doing justice to the crop. The application of superphosphate will in future be discontinued and substituted with Nitrate of soda which promises to be effective.

The following are the details of cost of cultivation of 1 acre of maize :—

Date. 1916.	Particulars.	Cost. Rs.	A.
27th Janury ...	First ploughing ...	3	0
8th February ...	Breaking clods ...	1	10
12th March ...	Manure and cost of spreading ...	13	0
26th „ ...	Second ploughing ..	1	12
26th „ ...	Cost of seeds 41 lbs. ...	2	4
26th „ ...	Breaking clods and covering seeds	1	0
18th May ...	First thinning and hoeing ...	3	0
14th June	Second „ „ ...	2	4
20th August	Harvesting, storing, etc. ...	4	4
3rd March 1917	Hulling and winnowing ...	3	14
	Total ...	36	0
	Yield—2,956 lbs. at Rs. 2-12 per maund of 82 lbs. ...	99	2
	Profit ...	63	2

Out of an area of 29 acres under maize cultivation during 1916-17, 20·25 acres were under the yellow round variety, which seems to be both the most profitable and popular with cultivators and merchants.

The white round variety is another favourite amongst the people. The red round is not cultivated by the raiyats and if by chance a cob or two appear with red grains amongst the crop it is usually given to fowls or cattle. The white and yellow flat varieties are known by the hill people to be heavy yielders, but there are a few who cultivate these varieties in fairly large areas to sell the crop practically immediately after harvesting to pay their debts, etc. These two varieties get mildewed very easily as the thin ends of the cobs are usually open, and are also very accessible to weevils.

The seed rate has been reduced to 40 lbs. this year and it is to be hoped to make a further reduction as time goes on. The quantity used at present is far too much which causes unnecessary thinning and a wastage of good seeds. It is surprising to note how the price

of the maize has remained stationary since the time of harvesting, *i.e.*, Rs. 2-12 which is the lowest we have obtained for the past 3 or 4 years.

B (2) Oryza sativa—Winter paddy—Dhan—Transplanted paddy.—Owing to the proximity of this farm to the hill ridge a very limited space is left to act as a collecting ground for water, and the crop in consequence is almost entirely dependent on the incidence of rainfall during these months to ensure that continuous supply of water, which is so essential for its growth. The seed beds are sown by the end of May; and transplanting commences by the end of June and is completed by the end of July. The harvesting takes place after fully 5 months of transplanting from the third week of November to the first week December.

The following table gives the area, outturn and yield per acre, of each variety and experiment carried out on this farm under report:—

Paddy, 1916-17.

Varieties of experiments.	Area.	Outturn.	Yield per acre.
Elevation—	Acres.	lbs.	lbs.
Touli 3317—3450'	5·40	8,282	1,533
„ 3550—3650'	2·33	3,105	1,332
„ 3500—3675'	2·75	4,510	1,640
„ 3675—3750'	1·0	1,373	1,373
Variety—			
Touli	0·25	430	1,722
Ratomasi	0·25	266	1,066
Mansaura	0·25	348	1,394
Timurah	0 25	266	1,066
Dhanasi	0·25	287	1,148
Ramtulshi	0·25	297	1,189
Manurial—			
Touli (Unmanured)	0·33	399	1,199
„ (Greenmanured Soybean ...	0·33	440	1,322
„ (4,100 lbs. farm yards manure) ...	0·33	328	984

Touli (which gives a large whitish grain) is the best yielder on the farm; consequently most of the paddy area was under this variety. A special seed selection is made annually at the time of harvesting on the fields together with the careful watch kept on the jhoras, all these combined have given us fair results this year under report.

(*a*) *Effects of elevation.*—This experiment with Touli paddy has been taken in hand since last year, for comparison as to what altitude paddy would do best on the farm and the surrounding hill sides. The results of which are as follows:—

Elevation Experiment.

Serial No	Area in acres.	Approximate elevation.	Variety.	Outturn in grains and straw.	Yield per acre.	Total cost of cultivation.
						Rs. A.
1	5·40	3317—3450'	Touli	8282G / 11931S	1533G / 2214S	214 0
2	2·33	3550—3650'	„	3105G / 5740S	1332G / 2460S	93 0
3	2·75	3500—3675'	„	4510G / 5524S	1640G / 2009S	106 0
4	1	3675—3750'	„	1373G / 1862 S	1373G / 1862S	36 0

As this experiment has been continued for the past two years only, no definite result can be recommended at present.

(*b*) *Variety.*—The following table gives the figures from 1911 to 1916 for the variety experiment :—

Variety experiment.

Variety.	Outturn per acre.											
	1911-12.		1912-13.		1913-14.		1914-15.		1915-16.		1916-17.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Touli (Hill paddy) ...	1,180	1,501	1,219	2,132	861	2,624	1,189	2,788	1,533	2,111	1,720	2,378
Dhanasi ,, ...	1,246	2,927	931	2,233	1 107	2,783	...	...	1,377	2,788	1,148	2,870
Krishnabag ,, ...	1,238	4,993	656	4,165	...	...	...	...	...	...	...	...
Mansaura ,, ...	967	3,247	1,317	1,836	1,107	3,116	861	1,968	1,500	2,738	1,392	2,460
Ratomarsi ,, ...	1,394	3,214	1,178	1,705	758	2,132	861	1,968	1,233	1,992	1,064	2,624
Ramtulshi ,, ...	1,574	4,387	603	2,927	717	3,280	656	2,296	1,558	3,058	1,188	2,952
Timurah ,, ...	...	...	...	...	963	3,075	461	2,952	1,525	3,140	1,064	2,706

From the above figures it is difficult to judge which is the best yielder. Some varieties require plenty of irrigation, while others don't and when the rainfall is heavy or light as the case may be, the varieties suffer or give good outturns. Ramtulshi, a fine variety of paddy, has given good results and the Touli variety has, year after year, shown marked consistency.

(*c*) *Manurial experiment.*—During the past 7 years an experiment has been conducted to note the effect of greenmanuring as compared with farm yard manure and an unmanured plot.

The results of the last three years are here recorded :—

Outturn per acre.

Manure.	Outturn per acre.					
	1914-15.		1915-16.		1916-17.	
	Grain.	Straw.	Grain	Straw.	Grain.	Straw.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1. Unmanured ...	1,343	3,198	1,260	1,906	1,199	1,845
2. 4,100 lbs. farm yard manure.	891	2,029	1,107	1,672	984	2,214
3. Greenmanure Soy-beans (Bhatmas).	1,076	2,952	965	1,580	1,322	2,091

From these figures there does not appear to be any advantage from manuring. Unmanured and green manured areas always give better yields than manured. It is never a practice to manure paddy areas on these hill sides, as all the washings, etc, are always directed into the fields from the jhoras.

Details of the cost of operations on a paddy area, as undertaken on the farm, produced from the cultivation book, are appended :—

Area 2·75 acres.

Variety—Touli—Unmanured.

Date.	Particulars.	Cost.
1916.		Rs. A.
5th May	... Ploughing seed-beds	1 4
7th ,,	... Cutting alis seed-beds ...	0 12
28th ,,	... Preparing seed-bed and sowing seeds	9 8
29th ,,	... Cost of 225 lbs. of seeds	

Date	Particulars.	Cost
1916.		Rs. A.
31st May ...	Ploughing area	9 0
18th June ...	Cutting alis	8 0
6th to 9th July ...	Second ploughing	6 8
Ditto ...	Building alis	7 0
Ditto ...	Levelling by bullocks	4 8
Ditto ...	Ditto hand	5 0
9th to 12th July ...	Transplanting	10 0
12th to 14th September ...	Weeding	12 8
June to November ...	Irrigation and Chowkidari ...	9 8
9th to 11th November ...	Harversting and carrying ...	10 0
4th to 6th December ...	Thrashing and winnowing ...	12 8
	Total cost of 2·75 acres ...	106 0
	Value of yield. ...	207 14
	Profit ...	101 14

Paddy was sold at 3 per maund (82 lbs.) and straw at annas 9 per maund (82 lbs).

B (3) Oryza sativa—Autumn paddy—(Aus Dhan or Ghaiya)—Unirrigated paddy.—This crop is usually sown broadcast on slopes thoroughly exposed to wind and air and well drained. On the farm it is sown in rows at 18 inches and seeds dibbled in at 8 inches apart.

In 1915-16 on an acre plot an outturn of 1,998 lbs. of grain *plus* 11,234 lbs. of straw was obtained at an expenditure of Rs. 46-4, while this year 1916-17 from ·75 acre plot an outturn of 1,373 lbs. of grain *plus* 6,560 lbs. of straw was obtained, the grain and straw being sold at Rs. 3 and Re. 0-2 per maund (82 lbs.) respectively, thus yielding a return of Rs. 60-4, while the cultivation expenses being Rs. 37-4 giving a clear profit of Rs. 23 for the experiment.

B (4). Eleusine—Coracana—Millet—Marwa—Kodo.—This crop grows in rotation with maize and is transplanted from the third week of June to the end of July, so that when the maize crop is harvested in August the kodo covers the land, having well developed in the interval.

The following table shows the average outturn per acre from 1909 to 1916 from 4·50 acres of land under marwa :—

	lbs.
1909	2,132
1910	1,619
1911	1,865
1912	1,927
1913	2,255
1914	1,886
1915	1,909
1916	1,640

During these past two years an experiment has been tried to test the yield between two varieties, the curly closed and the open loose varieties of marwa, cultivated extensively on these hills, and the following are the results obtained from an acre plot each :—

Year.	Variety.	Area.	Outturn.	Cost of cultivation.	Value of crop.
			lbs.	Rs. A.	Rs. A.
1915-16 ...	Curly closed ...	1	1,763	43 8	80 4
	Open loose ...	1	1,906	47 0	86 6
1916-17 ...	Curly closed ...	1	1,804	45 0	65 8
	Open loose ...	1	1,937	47 8	70 0

Straw estimated at Rs. 5 per acre for grazing last year the grain was sold at Rs. 3-8 per maund (82 lbs.), while this year the crop was sold at Rs. 2-12 per maund only. The crop was good all over the country, hence the low price.

This experiment will be continued for a few years longer before any conclusions are drawn.

The details of cultivation and cost per acre are as follows :—

Kodo 1 acre.

Particulars.

		Rs. A.	Rs. A.
Seed-bed—			
11th February ...	Ploughing	0 5	
Ditto ...	Breaking clods	0 3	
18th May ...	Manure and cost of spreading ...	1 4	
21st May ...	2nd ploughing	0 5	
Ditto ...	Breaking clods	0 3	
Ditto ...	24 lbs. of seeds	1 4	
10th July ...	Weeding seedbed	1 0	
			4 8
In maize crop—			
21st to 23rd July ...	Weeding	1 0	
Ditto ...	Hoeing and transplanting ...	17 0	
8th and 9th September.	Cutting and carrying maize stalks.	1 8	
12th to 14th September.	Weeding area	9 0	
28th to 30th November.	Harvesting and carrying ...	8 0	
15th to 16th December.	Thrashing and winnowing ..	6 8	
			43 0
	Total cost of 1 acre ...		47 8
	Yield—Grain 1,937 lbs. at Rs. 2-12 per maund (82 lbs.) ...	65 0	
	Straw estimated per acre ...	5 0	
			70 0
	Profit ...		22 8

B (5) Fagopyrum—Esculentum—Buckwheat—Phaphar.—This crop is grown in rotation after maize. Seed is sown in September and is ready for harvesting at the end of November or beginning of December.

A variety test with Japanese buckwheat has been going on since 1911 on the farm. This variety has been given up owing to its unsatisfactory yield. An area of 1·25 was cultivated under the local variety and an outturn of 820 lbs. of seeds was obtained at a cost of Rs. 15. The grain was sold for Rs. 2-12 per maund of 82 lbs.

The following table gives details of the cost of cultivation of this crop :—

Buckwheat—1·25 acres after maize.

		Rs. A.
10th September ...	Cutting and carrying maize stalks	2 0
12th September ...	Ploughing	4 8
13th September ...	Breaking clods and sowing seeds	2 4
Ditto ...	Cost of 1 maund (82 lbs.) seeds ...	2 12
29th and 30th November.	Harvesting, thrashing, etc. ...	3 8
	Value of yield ...	15 0
	Profit ...	12 8

B (6) Leguminous crops.—The following crops belonging to this order are grown in this district and on this farm :—

Botanical name.	English name.	Nepali name.	Number of varieties.	Remarks.
Glysine lispida ...	Soybean ...	Bhatmas	5	Lepcha name Silliyan.
Phaseolus mungo ...	Dal ...	Dal-kalai	1	
Phaseolus calcaratus ...	„ ...	Mashyem	1	
Dolichos biflorus ...	„ ...	Gahat ...	1	

(*a*) *Soybean—Glysine lispida.*—The following varieties were grown on the farm under report :—

Variety.	Area.	Outturn per acre.					Remarks.
		1912-13. Grain.	1913-14. Grain.	1914-15. Grain.	1915-16 Grain.	1916-17. Grain.	
		lbs.	lbs.	bs.	lbs.	lbs.	
Nepali Bhatmas ...	1	1,148	1,353	1,681	820	1,148	Whole season crop.
Barmati „ ...	1	410	1,066	697	410	861	Grown in rotation with maize.
Green „ ...	1	369	1,066	727	164	922	
Chocolate „ ...	1	779	1,189	799	635	820	
Black „ ...	1	512	922	676	440	984	

The first two varieties are erect growing, while the last three mentioned are of trailing habits.

All these leguminous crops can be grown in rotation with maize. However, Nepali soybeans produce very little when grown along with the maize, but when grown alone, yield heavily. They cannot, however, compete with maize. The cost of cultivation of these crops was Rs. 23-8 per acre, except the Nepali variety, which, when grown alone in the open, cost Rs. 42 per acre. The value of Nepali soybeans was Rs. 5 a maund of 82 lbs. and of the other varieties Rs. 3-12.

(*b*) *Kalai, Phaseolus mungo, Dal.*—This year 2·75 acres were sown with this crop, and an outturn of 1,045 lbs. of grain was obtained, that is, an average of 379 lbs. per acre. The heavy rainfall in September choked the crop with weeds in spite of the usual weeding.

(*c*) *Mashyem, Phaseolus calcaratus.*—For a couple of years the cultivation of this crop was stopped, but it was again taken up this year on an area of 1·45 acres. The outturn received from this area is 984 lbs. or at the rate of 676 lbs. per acre. The grain was sold at Rs. 3-2 per maund, 82 lbs.

(*d*) *Gahat, Dolichos biflorus.*—An area of one acre was cultivated under this crop and an outturn of 840 lbs. of grain was obtained at a cost of Rs. 25. The grain was sold at Rs. 2-8 per maund or 82 lbs., giving a paltry sum of Re. 0-10 as profit. The price of the grain instead of it being Rs. 3-2 as it has been these past 2 or 3 years was reduced to Rs. 2-8, there being no buyers.

(*e*) *Rahar.*—This new crop was tried on half an acre along with maize in rows of 2 feet apart. The maize return was at the rate of 1,947 lbs. per acre, while an yield of only 246 lbs. was got from the rahar.

The crop grew exceptionally well to a height of 8 to 10 feet and showed every sign of a good outturn, but the mistake was noticed too late that the crop was far too closely planted, as the crop yielded grain on the outside only while the interior of the field had absolutely no chance of even bearing pods. This will be rectified next year.

B (7) *a.—Sugarcane—Saccharum officinarum.*—This crop takes 18 months to come to maturity on these hills, as compared with 10 months on the plains.

Since 1910, an area of ·53 acre with a gradual slope has been ratooned year after year and has only this year been ploughed up and terraced for vegetable cultivation. This year under report a new terraced area of ·50 acre was planted out with fresh canes in the month of April 1916 and in March 1917, the crop was harvested, and gur manufactured at a total cost of Rs. 74, including all expenses, such as, cost of sugarcane cuttings, etc., etc., while an outturn of 1,496 lbs. of gur was obtained which was sold at Rs. 10 per maund of 82 lbs., *i.e.*, Rs. 182-8 yielding a profit of Rs. 217 per acre. In spite of the high price of gur at Rs. 10 per maund, there is a great demand for the gur even from places as far away as Gantok and other parts of Sikkim and Bhutan.

(*b*) *Fruit culture.*—In 1907, 158 English fruit trees were ordered from Messrs. Bunyard & Co., Maidstone, Kent, England, and these were received in December of the same year. The trees were first grown under shade until conditions were favourable for outdoor planting. The larger varieties were planted in June 1908 and the remainder in 1909.

Since planting, these trees have gradually died down or rotted, there being now only one tree (apple) left which is receiving much attention, and artificial treatment for it to come to the fruit bearing stage. The others received careful attention, but with no success owing to the high rainfall, the absence of frost, and the comparatively low elevation (3,650 feet), it has been decided to give a trial to trees from Australia and Japan instead of continuing with English varieties.

Nine Australian Naval orange trees were planted on 18th May 1911, and for the first time two of them this year bore a few fruits each; at present these give promise of doing well.

A few Japanese fruit trees were received from Mr. Proudlock of Dacca, in October 1915, out of which four are doing well, and were planted out during the last rains in their permanent places.

Pineapples.—Suckers of the "Queen" pineapple were obtained from the Kalimpong Government Fruit Nurseries in August 1908 and planted on ·15 acre. Since then planting has been extended all over the fruit area. The following results have been obtained from half an acre. The suckers were planted out in September 1912-13:—

	Cultivation expenses.	Outturn in pines.				Value.
	Rs. A.		As.	P.		Rs. A.
1912-13 and 1913-14	102 10	54	at 2	6	each	8 7
1914-15	27 4	497	„ 2	0	„	62 2
1915-16	31 0	1,002	„ 2	0	„	125 4
1916-17	35 0	2,700	„ 2	0	„	337 8
	195 14	4,253	.....			533 5

After deducting all expenses a profit of Rs. 337-7 is shown in four years The sum of Rs. 82 which was included in the cost of cultivation for 1912-13 was charged for 1,312 suckers at one anna each. These were not paid for by the farm, but they were taken from the Government gardens. This brings up the profit to Rs. 419-7 and yearly for another three years, a large returns are expected, with little expenditure. This variety is much sought after by the villagers and a large number of suckers have been again distributed this year.

Bananas, limes, papyas, peaches, plums, oranges, guavas, grenadillas (passion flower fruit) and tree tomatoes are also cultivated largely. From an area of 6·50 acres under various fruit trees the sum of Rs. 809-11-3 was realised. This includes the amount received from the sale of pineapples.

Heavy root pruning was carried out with six of our oldest peach trees in the month of November 1915, with the result that the trees were in full bloom about a fortnight earlier these last two years. As a consequence for the first time on record we have gathered fully ripe peaches from these trees. This method of improvement is being gradually extended to all fruit trees on the farm.

The new fruit area about 3·02 acres purchased last year from Mangal Singh adjoining this farm's garden yielded a sum of Rs. 70 only from sale of oranges and pears. About half the number of trees have been cut down, being too

closely planted and thoroughly neglected. This year this area 3·02 acres has been made over to the Darjeeling Improvement Fund for a fruit nursery and from here all kinds of graftings, seedlings, etc., will be supplied to the people of the district free of costs, also instructions given as to the methods of branch and root pruning, proper method of planting out a fruit orchard, spraying, etc., etc. The half sale-proceeds from this area is to be divided between the Homes and the Darjeeling Improvement Fund yearly, while the working expenses Rs. 52 per month will be supplied by the Fund, *i.e.*, allowance of the Manager Rs. 25 and 3 malis at Rs. 10, Rs. 9 and Rs. 8, respectively. The land has just been surveyed and it is hopod to have the area thoroughly laid out in plots with fresh trees planted, and a proper plan and names of trees all recorded in a separate book.

Rupees 150 worth of Australian fruit trees have already arrived from Bangalore purchased from Mr. J. M. Paul, such as apples, pears, peaches and apricots, and Royal George Seedless Naval Oranges. Other varieties will be ordered from Saharanpur and elsewhere.

(*c*) *Vegetable cultivation.*—On 1st March 1916, half an acre was put under vegetable cultivation, chiefly rainy weather crops, after the maize crop had been harvested and the land cleared, an area of two acres was brought fully under the cultivation of vegetables only. We have grown practically all kinds of vegetables in large quantities, and have sold these in the local bazar and sent the following down to the Sir Stuart Hogg Market, Calcutta, for auction.

Cauliflowers	130	heads.
Cabbages	240	„
Carrots	550	Dozens.
Celery	25	„
Kholrabies	183	„
Beetroots	25	„
Turnips	13	„

Besides the abovementioned we have supplied many basket loads to visitors to Kalimpong when returning to their homes. A large quantity of our cabbages and cauliflowers were sold at the Tista bazar by our farm coolies of their own free will on Sundays.

The total expenses up to 31st March 1917 are—

	Rs.	A.	P.
Cost of pipes, barrels, watering cans, implements and repairs and laying out, etc., etc. ...	125	8	0
Seeds and manures	135	0	0
Labour 4 malis at Rs. 30	360	0	0
Expenditure ..	620	8	0
From sale of vegetables up to 31st March 1917 ...	468	5	3
Loss ...	152	2	9

Naturally a loss will be incurred during the first year, as the contingent expenses have been great, of which we will have practically little or nothing in the coming years. Heavy manuring was very necessary as a good portion of the area was newly terraced and all the subsoil came to the surface, besides the soil was very rocky.

The reason for taking up this cultivation is to introduce it amongst the raiyats of this estate, and to put them in the way of exporting their produce and getting a fair price for their crop. A few consignments sent down to Calcutta did not pay us, due to the vegetables not being sent as street delivery.

(*b*) *Receipts and expenditure.*—A copy of the balance sheet for year ending 31st March 1917 is given below :—

Receipts.	Rs.	A.	P.
Balance from 1915-16 ...	3	0	0
Government grant ...	5,000	0	0
Sale of farm produce ...	4,689	12	6
Miscellaneous receipts ...	247	14	6
Bullocks	80	0	0
Total ...	10,020	11	0

Expenditure.		Rs.	A.	P
Labour	2,556 2 6			
Superintendence	2,390 10 0			
		4,946	12	6
Miscellaneous, seed manures repairs, postage, etc. ...		1,096	14	6
Bullocks		122	0	0
Capital outlay		1,400	0	0
Implements		69	13	0
½ crop to Homes ...		2,344	14	3
Insurance policy of renewal		31	10	0
Balance in hand ...		8	10	9
Total ...		10,020	11	0

The total value of produce shows a decrease of only Rs. 93-1-0 from that of last year in spite of the very poor prices we have obtained for the sale of our produce. The wages bill for monthly and daily labour shows an increase of Rs. 144-5-6 due to the cultivation of vegetables and work on the new property.

Capital expenditure.—Last year a piece of land in the very heart of the farm comprising of 7·05 acres of land under orchard, etc., with a kutcha house in which the Manager is living, was purchased at a cost of Rs. 10,750 *plus* an outlaying portion of 1·14 acres from the farm area (in part payment). A contribution of Rs. 2,375 was made last year towards this purchase from the farm balance, and this year a further sum of Rs. 1,400 was contributed for the same purpose

In addition, a piece of land to the extent of 1·89 acres lying on the north-western portion of this farm was purchased for Rs. 1,408, enabling us to straighten our boundary line and put up a substantial barbed wire fence.

(*e*) *Acknowledgement and training.*—We are again indebted to Mr. H.F. Green of Monsong for his kindness in valuing the farm stock. This, on 31st March 1917, was valued at Rs. 1,819 as compared with 31st March 1916, Rs. 2,134.

During the year under report no boys from the St. Andrew's Colonial Homes received training on this farm, but Dr. Sutherland with his senior boys and masters of the Normal School visited the farm on various occasions for lectures and practical demonstrations. Misses Smith and Mackintosh of the Girls' School also brought down their girls for these lectures, etc. Owing to the efforts of officials and various interested people our improvements are being brought to the notice of cultivators. Mr. H. R. Wilkinson, I.C.S., our Subdivisional Officer, who takes a very keen interest in the welfare of the people in all matters very kindly had a number of raiyats and mondols of various blocks down during the year for lectures and practical demonstration on maize seed selection at the time of harvesting in August and at final selection in March also during the making of *gur* from sugarcane.

(*f*) *Seeds and implements supplied.*—The following seeds, etc., were distributed during the year 1916-17 :—

	Mds.	srs.	lbs.
Maize	32	20	2665
Paddy and ghaiya	5	10	430
Soybeans	9	35	809
Buckwheat	1	30	143
Dal	0	35	71
Kodo	1	10	102

Maize Shellers or Hullers—7 at Rs. 2-2 each and 2 at Rs. 8 each—total 9.

	Number.
Orange gooties	175
Limes	29
Plantain or banana shoots	44
Pineapple suckers	4550
Sugarcane cuttings	1785

Now that a fruit nursery is being established on this farm, we hope to do good work amongst the hill people in fruit culture.

(*g*) *Management.*—The land for the farm was bought by the St. Andrew's Colonial Homes, and is subject to an annual rental of Rs. 75-15.

The farm is managed by the St. Andrew's Colonial Homes and the Bengal Government grant of Rs. 5,000 *plus* half sale-proceeds is sufficient to pay for the upkeep of the farm. The remaining half of the sale-proceeds is credited to the Homes. I was in charge during the year.

The programme of work for this farm is drawn up in consultation with the Agricultural Department, Bengal.

His Excellency the Governor of Bengal, the Hon'ble Mr. C. J. Stevenson-Moore, Mr. J. T. Rankin, Deputy Commissioner of Darjeeling, Mr. H. R. Wilkinson, Subdivisional Officer, Kalimpong, Sir Daniel Hamilton and Mr. Hartless, Superintendent. Government Fruit Gardens, Saharanpur, visited this farm.

Mr. Milligan, Director of Agriculture, Bengal, inspected the farm in March and Mr. F. Smith, Deputy Director, inspected in October 1916, April and June 1917.

KALIMPONG,
The 30th June 1917.

H. R. EDMUNDS,
Farm Manager.

ANNUAL REPORT OF THE DACCA CENTRAL FARM FOR THE YEAR 1916-17.

I. *Introduction.*—The Dacca Central Farm is situated five miles north of Dacca railway station near the village of Manipur. The farm was started by the late Eastern Bengal and Assam Government who acquired the land in 1906.

The area of the farm is 350·7 acres and consists of the following classes of land :—

High land.
Intermediate land.
Ravine or low land.

Although the total area is large for an experimental farm, uniform areas suitable for comparative experiments are difficult to obtain.

The high land of the farm is the typical laterite of the district, is difficult and expensive to cultivate and, without considerable additions of lime, phosphates and potash, yields poor crops. The lower areas, however, are suitable for transplanted paddy.

The farm on the whole is, however, quite suitable for the purpose for which it was originally intended, viz., agricultural investigation, provided that it is supplemented by a sufficient number of outside testing stations.

During the year under report, an area of 4 acres of culturable waste-land was reclaimed and laid out in plots suitable for experimental work. Considerable improvement has been effected by surface drainage on the high land during the rains, but it is apparent that nothing short of under-drainage will prevent water-logging.

II. *Rainfall (as affecting the crops).*—As the period which this report is supposed to cover June 30th, 1916 to June 30th, 1917, does not correspond to the crop season, a comparative rainfall statement for that period would be meaningless as a reference to crop experiments. The rainfall statement given in Appendix I gives the rainfall from February 1916 to January 1917.

It will be seen that the season was too dry at the outset for *aus* paddy, jute and sugarcane and other early sown crops. Transplanting of the *aman* varieties of paddy was also delayed for want of water, but subsequent good rains neutralized this to some extent, the final outturns of this class of paddy being fair.

III. *Varietal tests*—(*a*) *Aus paddy.*—Trials of different varieties of *aus* paddy were made and the results will be found in Appendix II.

(*b*) *Transplanted aman paddy.*—Mr. Hector's Indrasail selected variety has been definitely accepted as being the highest yielder and is now only tested against new varieties. The best yield from this variety was obtained from the Office Byde Field (an area of 3·6 acres) which yielded at the rate of 3.424 lbs. or over 41 maunds per acre. The average outturn of Indrasail and other varieties of paddy grown in the Dacca Farm from 1911—17 will be found in Appendix III.

(*c*) *Jute.*—Varietal experiments are conducted by the Fibre Expert. The following field tests were undertaken :—

No.	Name of jute.	Name of plot.	Area in acres.	Outturn per acre in lbs.	Remarks.
	Capsularis.				
1	Cultivator's variety of capsularis.	West Sho-ti	·5	712	
2	Assam Barapat ...	Ditto	·5	599	
3	Kakya Bombai ...	Ditto	·5	1,040	Fibre Expert's selected variety.
	Olitorius.				
1	Olitorius Rajshahi ...	Ditto	·5	1,176	
2	Cultivator's variety of olitorius.	Ditto	·5	1,172	

(*d*) *Sugarcane* (*Saccharum officinarum*).—The examination of a large number of varieties, Bengal and Exotic, were continued by the Agricultural Chemist.

The outturns of *gur* from the Exotics grown on $\frac{1}{5}$th acre plots will be found in Appendix IV.

IV. *Manurial experiments.*—(*a*) The permanent manurial experiments laid down by Messrs. Birt and Basu have been continued. Results to date are given in Appendix V.

(*b*) A series of experiments on the effect of potassium salts on the jute crop were conducted in collaboration with the Fibre Expert. The results have been published as a Pusa Bulletin. Qualitative results of great interest have been obtained on the upland (red laterite) soil. See Appendix VI.

Comparative experiments with dressings of the ash of the Water Hyacinth (*Eichornia crassipes*) and the plant in a rotted state indicate that the results obtained were mainly due to the potash contained in this plant.

(*c*) *Fodder—Joar* (*Sorghum vulgare*).—About 4 acres were grown under joar. The crop attained a good height and supplied fodder for the cattle for over three months. This year trials are being made of this crop for silage in "pit" silos.

Guinea grass has been introduced and is being extensively grown in odd corners on the edges of ravines, etc.

V. *Training of Apprentices.*—Three apprentices have been trained during the year under report.

VI. *Receipts and Expenditures.*

Receipts.

	Rs.	A.	P.
Total sale-proceeds credited to the Treasury ...	7,364	13	10
Value of Indrasail and *aus* paddy seed, etc., made over to Dacca Farm Seed Stores for distribution in the districts	4,813	2	6
Total ...	12,178	0	4

Expenditure.

The amount spent during the year was Rs. 35,048-1-0, of which Rs. 4,480-3 was on account of cultivation charges of areas, under the scientific sections and Rs. 395-13-1 on Dacca Farm Seed Stores.

VII. *Visits.*—The farm was inspected by His Excellency the Governor of Bengal and by the Hon'ble Members of the Bengal Executive Council, the Agricultural Adviser to the Government of India, the Imperial Sugarcane Expert, the Imperial Mycologist, the Collector of Dacca accompanied by a large number of Panchayats and by members of Co-operative Societies.

VIII.—*Staff.*—During the year under report, Babu Sujyoti Nath Chatterjee was in charge of the farm. He was assisted by a staff of four Overseers (including Dacca Farm Seed Store Overseer), two clerks and three fieldmen apprentices.

IX. *General.*—This farm has been much improved by the construction of new roads and drains and by the reclamation of odd areas. The Fibre Expert has now a self-contained area for field experiments. Plots are being tested with regard to their productive capacity for each of the main crops grown. It is hoped that thereby greater rapidity of arriving at definite conclusions on important questions will be attained. The standard varieties of crop grown in manurial and other experiments will be those selected for seed distribution. The farm will thus play an important part in the propagation of these varieties.

S. MILLIGAN,
for *Deputy Director of Agriculture, Bengal, Eastern Circle.*

APPENDIX I.

The maximum and minimum temperature as recorded in the farm are as follows:—

Month.	Outside.		Inside.	
	Maximum.	Minimum.	Maximum.	Minimum.
1916.				
February	102	44	100	54
March	100	52	99	47
April	111	60	110	55
May	114	72	112	72
June	112	72	112	72
July	107	76	110	78
August	106	72	108	74
September	108	74	110	76
October	108	72	108	70
November	104	60	106	50
December	98	52	96	50
1917.				
January	98	54	98	52

The table below gives the rainfall and number of rainy days during 1916-17 as compared with the normal:—

Month.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1916.				
February	1·79	1	1·12	1·8
March	Nil	Nil	2·59	3·5
April	14·91	13	4·00	6·7
May	3·35	5	9·60	11·3
June	9·99	19	13·38	15·2
July	3·97	10	12·85	17·75
August	18·24	21	12·53	17·40
September	14·69	12	9·43	11·70
October	11·45	12	Nil	Nil
November	·56	2	Nil	Nil
December	Nil	Nil	Nil	Nil.
1917.				
January	Nil	Nil.	Nil	Nil

APPENDIX II.

Serial No.	Plot No.	Name of variety.	Area in acres.	Outturn per acre.
				lbs.
1	1	Kataktara	·5	2,154*
2	2	Charnak	·5	1,172
3	3	Surjamukhi	·5	1,378
4	4	Larcose	·5	1,378
5	5	Boaljuri	·5	1,243

* Selected by the Economic Botanist as the highest yielding type examined by him.

Kataktara is a fine *aus* similar to Larcose and Surjyamukhi and will, it is hoped, prove suitable for those districts where earliness in ripening is not essential.

APPENDIX III.

Year.	Dacca selected Indrasail.	Average outturn of all other transplanted paddy.
		lbs. per acre.
1911-12 ...	Not grown	1,992 } Average of 3 years 1,625
1912-13 ...	Ditto	1,674 } lbs per acre.
1913-14 ...	Ditto	1,208 }
1914-15 ...	2,247 lbs. per acre ...	1,464
1915-16 ...	2,689 ditto ...	1,908
1916-17 ...	2,170 ditto ...	1,360
Average ...	2,368 ditto ...	1,577

APPENDIX IV.

No.	Name of crop.	Name of the plot.	Area in acres.	Outturn of gur per acre in lbs. Average of duplicates.
				lbs.
1	Yellow Tanna	Mastul high ...	·2	3,587
2	B. 208	Ditto ...	·2	3,616
3	Sonabali	Ditto ...	·2	1,684
4	Red Mauritius	Ditto ...	·2	1,580
5	Dacca Gandari	Ditto ...	·2	4,238
6	Suretha (Aligarh) ...	Ditto ...	·2	1,664
7	B. 147	Ditto ...	·2	3,372
8	J. 247	Ditto ...	·2	4,382

The outturn was poor on account of the unfavourable season. B 147 is steadily deteriorating. The Suretha cane from the United Provinces suffered from smutt. J 247 was less attacked by fungus and insect pests and was the best of the Exotics. The tests are being continued.

Among the local varieties from different parts of Bengal grown on a small scale, Punri from Berhampur gave the best results from an analytical point of view. This variety is being propagated for trial on a large scale.

APPENDIX V.

GOVERNMENT FARM, DACCA.

YIELDS PER PLOT $\frac{1}{16}$TH ACRE

N. HAZI, EXPT. PLOT, 1916-17.

W

Cowdung, 100 mds. per acre applied before *rabi* crop. *d*	Aus= 922 lbs.	Aus= 570⅛ lbs.	Aus= 512 lbs.	Aus= 785½ lbs.	Aus= 1037½ lbs.	Aus= 695⅝ lbs.	Aus= 1,459 lbs.	Aus= 1,330⅛ lbs.	*d*
Bone-meal, 3 mds. per acre applied before sowing kharif crop, and cowdung, 100 mds. per acre, applied before sowing *rabi* crop. *c*	Aus= 1,092.	Aus= 913⅜ lbs.	Aus= 541 lbs.	Aus= 683⅝ lbs.	Aus= 1,127⅜ lbs.	Aus= 1,177½ lbs.	Aus= 1,165½ lbs.	Aus= 1,253 lbs.	*c*
		C				**D**			
Bone-meal, 3 mds. per acre *b*	Aus= 797⅛ lbs.	Aus= 639 lbs.	Aus= 622 lbs.	Aus= 387½ lbs.	Aus= 981 lbs.	Aus= 563 lbs.	Aus= 1,005 lbs.	Aus= 1,067⅜ lbs.	*b*
Nil *a*	Aus= 323⅜ lbs.	Aus= 93⅜ lbs.	Aus= 320¼ lbs.	Aus= 123⅜ lbs.	Aus= 395⅜ lbs.	Aus= 387⅛ lbs.	Aus= 372 lbs.	Aus= 1,365⅛ lbs.	*a*
S	1	2	3	4	1	2	3	4	**N**
Cowdung, 100 mds. per acre *d*	Aus= 1,120¾.	Aus= 1,422¾ lbs.	Aus= 1,045¾ lbs.	Aus= 956¾ lbs.	Aus= 850 lbs.	Aus= 820.	Aus= 558¾ lbs.	Aus= 783 lbs.	*d*
Bone-meal, 3 mds. per acre and cowdung, 100 mds. per acre. *c*	Aus= 1,412 lbs.	Aus= 1,412 lbs.	Aus= 1,398⅜ lbs.	Aus= 1,110½ lbs.	Aus= 1,024⅛ lbs.	Aus= 554⅜ lbs.	Aus= 601½ lbs.	Aus= 820 lbs.	*c*
		A				**B**			
Bone-meal, 3 mds. per acre *b*	Aus= 1,293⅛ lbs.	Aus= 1,122 lbs.	Aus= 1,412⅜ lbs.	Aus= 956¼ lbs.	Aus= 623¼ lbs.	Aus= 289½ lbs.	Aus= 853¼ lbs.	Aus= 1.109¼ lbs.	*b*
Nil *a*	Aus= 1,468¼ lbs.	Aus= 1,443½ lbs.	Aus= 1,033¼ lbs.	Aus= 1,021⅛ lbs.	Aus= 414½ lbs.	Aus= 593 lbs.	Aus= 913 lbs.	Aus= 707⅜ lbs.	*a*
	1	2	3	4	1	2	3	4	

E

MAIN ROAD — ***RABI* CROP FAILED**

Nil. Lime, 10 mds. per acre. Lime, 30 mds. per acre. Lime, 60 mds. per acre.

Nil. Lime, 10 mds. per acre. Lime, 30 mds. per acre. Lime, 60 mds. per acre.

APPENDIX VI.

Number of plot.	Yield per acre.		Numbers of check plots.	Yield of check plots.		Mean of checks.		Difference between experimental and mean of checks.		Mean of duplicate differences per acre.	
	Rotted hyacinth without lime.										
	Mds.	srs.		Mds.	srs.	Mds.	srs.	Mds.	srs.	Mds.	srs.
5*b*	13	33	4*b*	9	36						
...	.....		7*b*	6	27	8	22	5	11		
...	.....		5*a*	10	27						
...	.....		5*c*	6	36					5	8
12*c*	15	0	11*c*	8	36						
...	.....		14*c*	7	11	9	34	5	6		
...	.....		12*b*	12	10						
...	.....		12*d*	11	2						
	Rotted hyacinth plus *lime (20 maunds per acre).*										
6*b*	14	23	...	.....		8	22	6	0	6	32
13*c*	17	17	...	.....		9	34	7	23		
	Rotted panagach without lime.										
7*a*	12	13	5*a*	10	28	11	28	0	23		
...	.....		8*a*	12	29					1	6
14*d*	12	5	15*d*	10	11	10	26	1	19		
...	.....		12*d*	11	2						
	Rotted panagach lime plus *(20 maunds per acre).*										
6*a*	13	35	...	.....		11	28	2	7	2	21
13*d*	13	18	...	.....		10	26	2	34		
	Hyacinth ash without lime.										
1*b*	17	22	1*a*	12	23	12	23	4	39		
15*c*	16	33	18*c*	11	16					5	33
..	.....		14*c*	7	14	10	7	6	26		
...	.....		15*b*	11	31						
	Hyacinth ash without lime.										
2*b*	13	38	1*c*	9	9	9	22	4	16		
17*c*	16	33	4*b*	9	36	10	7	6	26	5	21
	Hyacinth ash with lime (20 maunds per acre).										
3*b*	15	9	4*b*	9	36	.....		5	13		
16*c*	16	31	...	.....		10	7	6	24	6	3
	Carbonate of potash without lime.										
18*b*	20	0	18*c*	11	16						
...	.....		18*a*	18	0	14	28	5	12		
4*c*	11	14	5*c*	6	36			4	12	4	35
	Carbonate of potash plus *lime (10 maunds per acre).*										
17*b*	20	23	...	.....		14	28	5	35		
2*c*	14	26	1*c*	9	9	.....		5	19	5	27

Number of plot.	Yield per acre.		Numbers of check plots.	Yields of check plots.		Mean of checks.		Difference between experimental and mean of checks.		Mean of duplicate differences per acre.	
	Mds.	srs.		Mds.	srs.	Mds.	srs.	Mds.	srs.	Mds.	srs.
Carbonate of potash plus *lime* (*20 maunds per acre*).											
16*b*	17	8	15*b*	11	31	...	..	5	17	6	4
3*c*	14	34	1*c*	9	9	8	3	6	31		
...	.....		5*c*	6	36						
Mixed carbonates of soda and potash without lime.											
12*a*	16	13	10*a*	15	5	14	18	1	35	2	26
...	.....		14*a*	13	31						
5*d*	10	14	3*d*	7	0	6	38	3	16		
...	.....		6*d*	7	16						
...	.....		9*d*	6	16						
Mixed carbonates of soda and potash plus *lime* (*10 maunds per acre*).											
13*a*	16	20	.....	.....		14	18	2	2	3	2
7*d*	11	0	.....	.....		6	38	4	2		
Mixed carbonates of soda and potash plus *lime* (*20 maunds per acre*).											
11*a*	16	35	.....	.....		14	18	2	17	3	25
8*d*	11	32	.....	.....		6	38	4	34		
Carbonate of soda without lime.											
15*a*	15	6	14*a*	13	31	.....		1	15	1	0
1*d*	7	26	3*d*	7	0	.....		0	26		
Carbonate of soda plus lime (*10 maunds per acre*).											
17*a*	15	6	14*a*	13	31	.....		1	15	1	16
4*d*	8	18	3*d*	7	0	.....		1	18		
Carbonate of soda plus *lime* (*20 maunds per acre*).											
16*a*	15	32	14*a*	13	31	.....		2	1	3	15
2*d*	11	30	3*d*	7	0	.....		4	30		
Sulphate of potash without lime.											
11*b*	12	25	12*b*	12	0	10	5	2	20	2	30
...	.....		9*b*	9	8						
...	.....		11*c*	8	36						
10*c*	12	1	11*c*	8	36	9	2	2	39		
...	.....		8*c*	9	8						
Sulphate of potash plus *lime* (*20 maunds per acre*).											
2*a*	14	24	1*a*	12	22	11	2	3	22	3	17
...	.....		5*a*	10	28						
...	.....		4*b*	9	36						
18*d*	16	10	18*c*	11	16	.....		4	34		
10*b*	13	3	.....	.....		10	5	2	38		
9*c*	11	15	.....	.....		9	2	2	13		

Number of plot.	Yield per acre.	Numbers of check plots.	Yields of check plots.	Mean of checks.	Difference between experimental and mean of checks.	Mean of duplicated differences. per acre.
	Mds. srs.		Mds. srs.	Mds. srs.	Mds. srs.	Mds. srs.
Mixed sulphate and chloride of potash plus *lime (20 mds. per acre).*						
3*a*	13 34	...	.....	11 2	2 32	4 24
17*d*	17 10	18*c*	11 16	10 33	6 17	
...	.....	15*d*	10 10			
Chloride of potash plus *lime (20 mds. per acre).*						
4*a*	15 31	...	.....	11 2	4 29	6 12
16*d*	18 28	...	.....	10 33	7 35	
Nitrate of potash—28 lbs. nitrogen per acre, and 77 lbs. potash per acre—applied in three top-dressings, castor cake, 12lb. nitrogen per acre and lime 20 mds. per acre.						
9*a*	16 35	8*a*	12 19	13 32	3 3	2 32
...	.....	10*a*	15 5			
10*d*	8 36	9*d*	6 16	.....	2 20	
...	.....	12*d*	.....			
Nitrate of potash and castor-cake as above (without lime).						
8*b*	11 16	9*b*	9 8	.....	2 8	1 7
11*d*	8 35	12*d*	11 2	8 29	0 6	
...	.....	9*d*	6 16			
Nitrate of potash top-dressing of 48 lbs. (K. No. 3) per acre 4·7 lbs. nitrogen per acre.						
13*b*	12 35	12*b*	12 10	12 0	0 35	1 4
...	.....	15*b*	11 31			
6*c*	9 15	5*c*	6 36	8 2	1 13	
..	.....	9*c*	9 8			
Nitrate of soda top-dressing of 40 lbs. (Na No. 3) per acre 4·0 lbs. nitrogen per acre.						
14*b*	11 8	...	.....	12 0	−0 35	
7*c*	8 7	...	.....	8 2	+0 5	

THE DACCA FARM SEED STORE.

The seed store was under a separate Superintendent till March 1916 when the post was abolished and the management was vested with the farm Superintendent who was given an Overseer to assist him.

The main function of the seed store is to store and distribute seeds grown or recommended by the experts.

During the year under report, the following quantities of seeds and manures were distributed from the stores :—

1.	Indrasail seed	60,019 lbs.
2.	Dhaincha seed	91 „
3.	Jute seed	17,904 „
4.	Cowpea	10 „
5.	Bonemeal	11,625 „
6.	English vegetable	4,390 pkts.

In view of the large quantities of Indrasail paddy it is becoming urgently necessary to provide for suitable seed bins.

The annual receipts of the seed store is Rs. 1,812-10-6 and articles costing Rs. 5,353-8-6 were distributed for departmental purpose.

The total expenditure incurred in 1916-17 was Rs. 1,408.

ANNUAL REPORT OF THE BURIRHAT FARM, RANGPUR, FOR THE YEAR 1916-17.

The Burirhat Tobacco Farm is situated on the borders of the tobacco growing tract of North Bengal, 5 miles north of the town of Rangpur.

The farm is 52 acres in extent and is divided into five blocks. It was at one time considered that only 5 to 10 acres were suitable for tobacco growing, but the work done during the last two years has proved that, with proper treatment, any part of the farm may be made to produce good leaf.

The soil is a sandy loam with a sandy sub-soil and is deficient in lime.

II. *Meteorology.*—The rainfall of this district is high and is well distributed over the period April—October. The following table gives the rainfall and number of rainy days during the year as compared with the normal :—

Month.	Actual.		Normal.	
	Rainfall.	Days.	Rainfall.	Days.
1916.				
April	5·41	10	3·01	4·3
May	2·74	5	10·66	11·5
June	22·20	16	18·00	15·7
July	30·53	18	15·89	15·0
August	22·99	12	12·80	13·7
September	9·70	16	14·24	13·3
October	6·63	8	4·87	4·4
November	·37	2	·12	0·2
December	Nil	Nil	·05	0·2
1917.				
January	Nil	Nil	·50	0·9
February	·29	2	·54	1·2
March	·24	2	1·25	1·8

From the above table, it will be seen that this year rainfall was below normal in May, excess in July and again in defect in September.

The weather in September proved unfavourable for raising seedling and transplanting was consequently rather late. The weather in February and March was favourable for curing tobacco.

III. *Crops.*—The following table gives the areas under crop during the year:—

Bhadoi crop or rains crops.

	Acres.
Cowpea (*Vigna katiang*) for green manure	19·16
Joar (*Sorghum vilgare*) for fodder	1·50
Aus paddy (*Oryza sativa*)	18·41
Total ...	39·07

Rabi or cold weather crops.

Tobacco (*Nicotiana tabacum and Nicotiana rustica*)—

Local	10·66
Sumatra	2·50
American and Turkish cigarette tobaccos	0·50
Oats (*Aveba sativa*) and peas (*Pisum arvense*)	20·09
Wheat (*Triticum sativum*)	2·66
Lentils (*Arvum lens*)	2·66
Total ...	39·07

Last year's scheme of experimental work was continued. This may be recapitulated—

(1) The growing of Sumatra tobacco for cigar wrappers.

(2) A collection and comparison of the different varieties of tobacco grown in the Province.

(3) Selections from the local varieties of tobacco.

(4) Manurial experiments with tobacco.

1. The price of *Sumatra tobacco* showed a great improvement during the year as will be seen from the following statement:—

	Last year's crop sold at	This year's crop sold at
	As.	Rs. A.
Mark A	12 per lb.	1 8
Mark B	10 „	1 4
Mark C	6 „	0 10

This year a large area was put under this variety. Two bighas were grown by neighbouring cultivators. A cheroot-maker was employed throughout the year.

Cigarette tobacco.—A small area was sown with American cigarette varieties such as White Bualey, Yellow Prior and Orinoco, etc. This year the crop was grown for propagation purposes only. A small quantity of Turkish cigarette tobacco was also grown.

2. *Comparison of local varieties.*—Thirty-seven varieties of tobacco collected last year were grown. So far as this work has gone none of the outside varieties have been found equal to those of the Rangpur district as regards yield. The Chhack Pata tobacco of Chittagong has proved to be a good cheroot tobacco.

3. *Improvement of the local Chitakhat Bengal variety.*—This variety is an ideal one for the Burmese market and work on its improvement by selection has been continued.

4. *Manurial experiments.*—The value of cowpeas as a green manure has been established and is being demonstrated in the tobacco tract.

5. *Demonstration.*—With a view to popularize the cultivation of Sumatra tobacco, a kutcha curing house was erected this year at a village

in the neighbourhood of the farm by the Local Agricultural Association. The tobacco was grown and cured under the supervision of the Farm Superintendent and has been purchased by the Agricultural Association at Rs. 22 per maund (82 lbs.)

Implements.—Spring Tooth Harrows have proved very successful in the light soil of the farm. The Planet Junior Hoe is invaluable in the interculture of tobacco.

Inspection and visits.—The farm was visited by the Agricultural Adviser to the Government of India, the Hon'ble Nawab Sir Syed Samsul Huda, the Commissioner of the Rajshahi Division, and several times by the Collector of Rangpur, the Director of Agriculture and the Deputy Director of Agriculture, Eastern Circle.

Neighbouring cultivators are frequent visitors. A seed depôt has been erected near the farm to meet their requirements.

Receipts and expenditure.—The total expenditure, exclusive of the establishment, was Rs. 5,979-7-6, whilst the receipts amounted to Rs, 2,292-6-3. The stock in hand is valued at Rs. 5,500.

JAMINI KUMAR BISWAS,

Farm Superintendent.

ANNUAL REPORT OF THE RAJSHAHI AGRICULTURAL STATION FOR THE YEAR ENDING 30th JUNE 1917.

THE Rajshahi Agricultural Station is situated on the outskirts of the town of Rampur Boalia in the district of Rajshahi and is meant to serve as the experimental station for the Rajshahi Division.

The total area of the Farm is 63 acres of which 50 acres are under cultivation, the remainder being occupied by roads, buildings, etc.

The soil of the Farm contains a high percentage of lime but is poor in potash, phosphate and organic matter. About one-third of the land is low lying suited to winter rice and jute cultivation; the remainder consists of high land with lighter soil and suitable for jute, *aus* paddy and sugarcane.

An analysis of the soil by Dr. Leather in 1907 showed the following composition :—

Silica	77·90
Ferric oxide	4·56
Alumina	6·15
Lime	3·29
Magnesia	1·37
Potash	0·65
Soda	0.21
Phosphoric acid	0·11
Sulphuric acid	0·03
Carbonic acid	2.34
Organic and combined matter	3·39
Total ...	100·00

The Farm in divided rectangularly by the two central roads into four blocks.

Improvements and construction.—During the year under report a pucca office building has been constructed at a cost of Rs. 1,850 and a pucca road commencing from the southern gate of the Farm to the office building has been constructed at a cost of Rs. 1,395. The construction of the office building has supplied a long felt want. Some alterations are still required in the godown and in the Farm Superintendent's quarters. With these improvements the Farm should be fully equipped as regards buildings.

Rainfall as affecting crops.—The following table indicates the actual rainfall in comparison with the normals.

Month.	Actual.		Normal.	
	Rainfall.	Number of rainy days.	Rainfall.	Number of rainy days.
1916.				
April	1·90	4	1·81	2·9
May	0·70	1	5·56	7·7
June	19·18	15	10·81	12·6
July	11·22	11	11·45	15·1
August	12·22	15	10·75	14·7
September	13·25	11	10·40	12·4
October	16·60	13	4·46	4·9
November	2·25	2	0·31	0·6
December	Nil	Nil	0·06	0·2
1917.				
January	0·01	1	0·34	0·8
February	0·59	3	0·84	1·3
March	0·62	2	1·15	1·6

A perusal of the statistics shows that the season was exceptionally dry in its early stages and on that account was a bad one for early sown crops such as jute, sugarcane and *aus* paddy, but was good for transplanted *aman* (Oryza sativa) as there was no want of rainfall after transplanting till harvest time.

The programme of the work undertaken included—

(I) Varietal tests of—

(*a*) sugarcane *Sacharum-officinarum*),
(*b*) *aus* paddy (*Oryza sativa*),
(*c*) *aman* paddy (ditto),

(II) Seed selection of—

(*a*) jute (*Corchorus capsularis*),
(*b*) sugarcane,
(*c*) *aman* paddy.

(III) Manurial experiments with—

(*a*) sugarcane.

(I) (*a*) *Sugarcane.*—The following notes have been made on the varieties grown:—

Vendhamukhi has been found to be the best *gur* making variety with regard to both quantity and quality. The *gur* is full of crystals and keeps all right throughout the rainy season.

Dacca gandari and B 147 are the best chewing canes.

Yellow Tanna grows very well in this farm and it is much liked by local cultivators on account of its upstanding character (with no tendency to lodge) and hardness which minimises damage by pigs and jackals. This cane does not appeal to thieves who wish chewing canes. The defect of this cane is that its *gur* is not rich in sugar, nor does it keep long.

Red Mauritius is not suited to Rajshahi, being too delicate and unable to withstand either drought or excess of moisture. Last year almost all the clumps were attacked with red-rot.

B 3412.—This is the first year of this cane on this farm and it seems to be a very promising variety. Tests will be continued this year.

During the year under report 52,896 sugarcane cuttings of different varieties have been distributed to outside growers.

Aman paddy (*Oryza sativa*).—A varietal experiment was conducted with the following varieties:—

(1) Dacca No. 1 or Indrasail (Mr. Hector's selected paddy).
(2) Chinigura (Dacca district paddy).
(3) Kataribhog (Dinajpur district paddy).
(4) Gazia (local).

Duplicate plots were planted of each variety, each plot being one-fifth of an acre. The results are given below:—

Names.	Average yield per acre.
	lbs.
Indrasail	2,282
Chinigura	1,880
Kataribhog	1,810
Gazia	2,010

The plots were uniformly manured with rotten cowdung at the rate of 6,150 lbs. per acre. Indrasail gave the highest yield and it is a favourite with the raiyats.

This year 4,100 lbs. of selected seed of Indrasail paddy have been issued to local cultivators from the farm.

Jute (*Corchorus olitorius*).—A number of pure lines of olitorius jute were grown for the Fibre Expert.

Potatoes (*Solanum tuberisum*).—Potato has not proved a satisfactory crop owing to want of irrigation facilities.

Pusa wheat (*Triticum sativum*).—Pusa wheat has been tried on this farm for the last two years. During the year under report, the crop gave an outturn of 50 maunds or 4,100 lbs. of grain from 3⅝ acres of land which is good for Rajshahi Division. The quality of the grain is much appreciated by the surrounding cultivators and it has been decided to distribute some seed of one variety.

Gram (*Cicer arientum*).—Gram was grown as a rotation crop on an area of 8½ acre. The crop gave an outturn of 694 lbs. or about 8½ maunds per acre.

Khesari (*Lathyrus sativus*).—Khesari was grown as a catch crop over an area of 17 acres with winter rice. The total cost of the seed which was sown at the rate of 82 lbs. per acre was Rs. 50 for the 3 acres. About half the area of the crops was sold when green to the local *Goalas* for Rs. 90 and the rest being fed to the Farm bullocks.

Oats (*Avena sativa*).—This crop was grown on two acres of land, the outturn being 23 maunds or 1,886 lbs. of grain.

Implements.—The Planet Junior bullock hoe is in constant use in the sugarcane areas. Three acres of sugarcane can be hoed in a day with a pair of bullocks and two labourers.

Planet Junior hoes have been found very useful for interculture of sugarcane, potatoes and English vegetables.

RECEIPTS AND EXPENDITURE.

Receipts.

	Rs.	A.
Valuation of crops raised—		
Aus paddy, 19 maunds 25 seers at Rs. 2-8 per maund ...	49	2
Aman paddy, 402 maunds at Rs. 2-12 per maund ...	1,105	8
Jute seeds, 8 maunds 6 seers at Rs. 20 per maund ...	163	0
Oats, 23 maunds at Rs. 2-12 per maund	63	4
Jute fibre, 16 maunds at Rs. 6 per maund	96	0
Gram, 71 maunds at Rs. 2-10 „	186	6
Barley, 35 seers at Rs. 2-8 „	2	3
Peas, 20 seers at Rs. 2-8 „	1	4
Gur, 135 maunds at Rs. 7 „	945	0
Sugarcane cuttings, 52,000 at Rs. 4 per thousand	208	0
Wheat, 48 maunds at 3-8 per maund	168	0
Kheshari (sold green)	90	0
English vegetables, plaintains, grass, etc.	150	0
Total ...	3,227	11

Expenditure.

	Rs.	A.	P.
Feed of cattle	294	4	10
Purchase of seeds and manures	625	1	6
Wages of farm labourers	2,403	10	10
Railway and steamer freights	39	7	3
Cooly and cart hire	17	9	9
Service postage stamp	50	4	0
Purchase and repair of furniture	48	1	0
Miscellaneous contingencies	374	14	3
Total ...	3,853	5	5

Exclusive of the cost of establishment and interest on capital expenditure the loss on the year's working is Rs. 626, which is mainly due to the unfavourable weather at the beginning of the season.

KALI DAS ROY,
Superintendent.

ANNUAL REPORT OF THE RANGPUR DEMONSTRATION FARM FOR THE YEAR 1916-17.

ORIGINALLY under the administration of the Rangpur Agricultural Association, this farm has been worked by the Agricultural Department as a Demonstration Farm since 1911. At the Provincial Agricultural Conference held at Rangpur in February 1915, it was agreed to add to its functions by making it a seed producing farm for the district.

The farm is centrally situated adjoining the town of Rangpur and consists of 20 acres of light, but fertile loam (*vide* Dr. Leather's report detailed in the Annual Report of 1915).

Monthly rainfall for the year under report.

Months.	ACTUAL.		NORMAL.	
	Rainfall.	Days.	Rainfall.	Days.
1916.				
April	4·01	8	3·01	4·3
May	3·33	4	10·01	11·5
June	18·85	17	18·00	15·7
July	35·50	24	15·89	15·0
August	15·54	10	12·80	13·7
September	9·18	12	14·24	13·3
October	5·45	10	4·87	4·0
November	0·24	1	0·12	0·2
December	Nil	Nil	0·05	0·2
1917.				
January	Nil	Nil	0·50	0·9
February	0·32	1	0·54	1·2
March	0·18	1	1·25	1·8

The rainfall in May was much in defect of the normal, while that of July was much in excess. The result may be seen in the low outturn of the *aus* paddy and jute crops owing to drought in May, and of the low-lying paddy owing to flooding in July.

Crop outturns for the year.

Aus paddy (*Oryza sativa*).—The following three varieties were grown. The outturns were poor owing to the reasons given above :—

Name of paddy.		Area in acres.	Actual outturn.	Outturn per acre.
			lbs.	lbs.
Transplanted ...	Dacca No. 1 (Indrasail).	·102	250	2,248
	Ditto ...	6·2	12,800	2,064
	Kataribhog ...	1·26	1,310	1,034
	Joshoa ...	1·33	2,320	1,740
Low land, broadcasted, damaged by flood.	Batho ...	2·0	1,290	645

Transplantation was late this year owing to want of water.

Mr. Hector's Dacca selected variety, however, again showed its great adaptability to varying conditions giving a considerable increase in yield over the others.

Jute.—The following test between the Dacca selected Kakya Bombai and local Heoti jute was carried out :—

Variety.	Area in acre.	Yield per acre.
		lbs.
Kakya Bombai ...	·39	1,203
Local Heoti ...	·30	820

The yields are comparatively low owing to the unfavourable season, but the Dacca selected variety was better in every respect.

Sugarcane (*Saccharum officinarum*).—Sugarcane was grown mainly for the supply of cuttings to cultivators, the lower part of the cane being made into *gur*. One acre of Dacca Gandari was grown as a ratoon crop. The following five new varieties were planted this year. The details are given below :—

Variety.	Area in acre.	Actual outturn.	Outturn per acre.
Ratooned Dacca Gandari.	1	2,592 lbs. *plus* Rs. 24-15 worth of whole cane sold.	2,592 lbs. *plus* Rs. 24-15 worth of whole cane sold.
Dacca Gandari (new).	⅔	3,520 lbs. *plus* 22,331 cuttings.	5,280 lbs. *plus* 33,496 setts.
Khagri ...	·054	67 lbs. *plus* 1,816 cuttings.	1,121 lbs. *plus* 32,688 setts.
B. 147 ...	⅙	693 lbs. *plus* 5,945 cuttings.	4,160 lbs. *plus* 35,670 setts.
Red Mauritius ...	·0114	55 lbs. *plus* 1,520 cuttings.	4,800 lbs. *plus* 132,240 setts.
B. 3412 ...	·081	446 lbs. *plus* 16,498 cuttings.	5,352 lbs. *plus* 127,176 setts.

Rabi crops.

	Acre.	Rs. A. P.	Rs. A.
Cabbage	·14	78 7 9	562 8
Cauliflower	·13	13 13 0	106 4

Potatoes (*Solanum tuberosum*).—Darjeeling potatoes were grown after cowpea as green manure, in addition a dressing of cowdung at the rate of 175 lbs. per acre was applied. The average outturn of the Darjeeling variety was 18,000 lbs. per acre and on a small plot ran as high as 21,120 lbs. A small plot of the common local variety was grown. The outturns are not strictly comparable, but are given below :—

VARIETY.	Area in acres.	Actual outturn.	Outturn per acre.
	Acres.	lbs.	lbs.
Darjeeling (small plot)	·12	2,512	21,120
Ditto ditto	1·0427	18,825	18,000
Silbilati (local)	·024	182	7,600

Pusa wheat No. 6 (*Triticum vulgare*) was grown on a ·76 acre plot, but had to be fed to the cattle owing to the absence of sufficient moisture to mature the crop.

Distribution of seeds and manures.—The following seeds and manures were distributed from the farm to cultivators :—

	lbs.
Aus paddy—	
Sonamail	180
Aman paddy—	
Dacca No. 1 (Indrasail)	11,120
Kataribhog	380
Jashoa	80
Batho	20
Sugarcane cuttings	32,081
Bonemeal	760 lbs.
Cowpeas	301 „
Jowar	149 „

Farm accounts.

	Rs.	A.	P.
Receipts—			
Credited into the Treasury	1,552	11	6
Bills outstanding*	985	13	9
Value of stock in hand	239	4	9
Total ...	2,777	14	0

	Rs	A.	P.
Expenditure—			
Purchase of cattle	219	1	6
Feed of cattle	146	10	0
Seeds, implements and manures	310	9	6
Wages of labourers	1,799	10	3
Petty repairs	151	0	9
Railway and steamer freights	4	10	0
Service postage stamps	15	0	0
Office and miscellaneous expenses ...	311	6	0
Total ...	2,958	0	0

* Mostly sums due by the District Agricultural Association and District Agricultural Officer for seeds, etc., supplied for distribution.

Training of apprentices.—No apprentice was sent for training to the farm during the year.

Inspection.—The farm was inspected by all officers of the Department as well as by the Collector of the district.

General.—The farm has been greatly improved by detailed attention to the upkeep of roads and bunds. Field tests regarding the comparative fertility of the plots have been instituted.

JAMINI MOHAN CHAKRAVARTI,
Overseer in charge.

ANNUAL REPORT OF THE RANGPUR DAIRY FARM FOR THE YEAR ENDING THE 30TH JUNE 1917.

I.—*Reclamation, etc.*—During the year under report reclamation work has been continued and about 50 additional acres have been brought under cultivation. Systematic drainage has been introduced. Most of the land is now free from the danger of water-logging. The levelling and laying out of the farm was continued.

The farm now consists of the following areas :—

	Acres.
Under cultivation	250
Bamboo groves	7
Roads, drains, etc.	13
Farm steading	13
Tanks and thatching grass areas ...	10
Pasture	33
Unreclaimed	6
Total ...	332

II.—*Policy of the farm.*—It has been apparent for some time that the original policy of this farm required modification, the real objective being obscured by the inclusion of too many side issues in the programme. The following policy has, therefore, been decided upon and approved by Government (*vide* Government order No. 169T.—R., dated the 24th April 1917).

The farm should be conducted as an experimental one as regards cattle-breeding. Attempts should be made to produce definite results within a reasonable time, and the breeding work should be so organized that definite information will be forthcoming as will help Government to decide whether direct importation of superior cattle from outside or local selection is the policy by which the general improvement of the cattle of this Province should be sought. It has been further decided that dairying operations should be subsidiary to cattle-breeding. The farm should be used as a fodder farm for the production of food for the cattle, but questions relating to the improvement of fodder crops should be studied. Spare areas can be used for growing seed for distribution.

With reference to breeds, it has been decided that the farm should use indigenous cows of one type as the basis of experimental work and two classes of bulls, local and imported, the latter being selected animals of a milking type of Hansi cattle. There will thus be two distinct herds, the indigenous and cross-bred.

III.—*Stock.*—Last year there were 99 cows on the farm. The worst of these are being gradually weeded out and replaced by animals conforming to a definite type.

The following are the numbers of animals in the farm on the 30th June 1917 :—

Cows	...	73
Calves	...	18
Young stock, 1 year and above { Male ...	...	15
Young stock, 1 year and above { Female ...	...	16
Bullocks	...	65
Bulls	...	2

Two cows and 17 young stock (including calves) died during the year.

This year the average yield of the herd works out at 4·3 lbs. per day as against 4 lbs. last year. The increase is, however, not outside the bounds of experimental error.

The qualifying yield for admission to the stud was formerly fixed at 1,000 lbs. of milk per annum. Low although the standard is, only 19 cows came up to it this year as compared with 20 last year.

The following table shows the average daily yield of milk :—

1916.			1917.		
July	...	4·7	January	...	3·9
August	...	4·5	February	...	3·9
September	...	4·6	March	...	4·4
October	...	4·2	April	...	4·3
November	...	4·1	May	...	4·4
December	...	3·9	June	...	4·8

IV.—*Disease.*—The herd was free from infectious disease throughout the year. Last year's attack of rinderpest, however, left its mark, as 25 cows aborted. All possible care has been taken to prevent contagion from outside, and it is hoped that outbreaks similar to last year's will be prevented.

V.—*Crops.*—Rainfall statistics are as follows :—

Months.	Actual.		Normal.	
	Rainfall.	Rainy days.	Rainfall.	Rainy days.
1916.				
July	35·50	24	15·89	15·0
August	15·54	10	12·80	13·7
September	9·18	12	14·24	13·3
October	5·45	10	4·87	4·0
November	0·24	1	0·12	0·2
December	Nil	Nil	0·05	0·2
1917.				
January	Nil	Nil	0·50	0·9
February	0·32	1	0·54	1·2
March	0·18	1	1·25	1·8
April	Nil	Nil	3·00	4·3
May	14·84	13	10·66	11·5
June	17·98	26	18·00	15·7

The farm is now mainly under fodder crops, chiefly Jowar and Soybeans. The following additional crops were grown :—

(*a*) *Sugarcane.*—This crop grew well and was free from any serious disease. 82,800 cuttings have been supplied from the farm for demonstration work outside.

The highest outturn of *gur* was obtained from 1 acre of Gandari cane grown on good land and amounted to 68½ maunds (5,617 lbs.).

(*b*) *Winter paddy.*—Six varieties of paddy were grown experimentally on about one-third of an acre each. The outturns are as follows :—

Variety.	Area planted in acres.	Actual outturn in lbs.	Outturn per acre in lbs.
Lohadang	0·33	475	1,425
Lambachikan	0·33	771	2,313
Kataribhog	0·45	697	1,548
Indrasail (Dacca No 1) ...	*0·33*	*1,171*	*3,513*
Bhabachandrabhog ...	0·38	719	1,871
Joshoa	0·37	690	1,872

Mr. Hector's Dacca Selected Indrasail again gave the best outturn yielding at the rate of 3,513 lbs. per acre. Although the results cannot be held to be strictly comparative, the outturn is highly satisfactory.

Jute.—The Fibre Expert's selected Kakya Bombai was tested against local varieties on a large number of small plots. The outturns were as follows:—

Varieties.	Actual area in acres.	Actual outturn in lbs.	Outturn per acre in lbs.
First series—			
Kakya Bombai, 6 plots 1/20 of an acre each ...	0·30	404	1,347
Other 13 varieties tried on 13 plots 1/20 of an acre each.	0·65	871	1,340
Second series—			
Kakya Bombai (propagated at Chinsura) 9 plots 1/20 of an acre each.	0·45	974	2,164
Other 25 varieties tried on 25 plots 1/20 of an acre each.	1·25	2,126	1,701

The results show the possibilities of the Dacca selected variety under suitable conditions. Incidentally they demonstrate the necessity of the standardization of plots.

Potatoes.—The following table shows the outturn of the different varieties of potatoes grown. In this district there is some difficulty in disposing of the Darjeeling variety, while local potatoes find a ready market, their flavour being preferred by the people. The Darjeeling variety, however, gives a far higher outturn:—

Variety of potato.	Area in acres.	Actual outturn in lbs.	Outturn per acre in lbs.
Darjeeling	4·41	53,361	12,082
Nainital	0·16	1,374	8,244
Local	0·57	3,626	6,220

Receipts and expenditure.

	Rs.	A.	P.
Expenditure—			
Special contingencies	550	0	6
Recurring expenditure	28,530	15	3
Value of cattle food held over from previous year's stock	1,774	4	9
Total ...	30,855	4	6
Receipts—			
Amount credited into the Treasury	13,679	12	3
Amount realised in June 1917, but not credited into the Treasury before 1st July	259	0	6
Stock in hand	3,716	7	6
Bills outstanding	3,767	2	9
Total ...	21,422	7	0
Deduct value of farm produce of previous year sold and realised during the present year	2,741	5	0
Total ...	18,681	2	0

VI.—*Staff.*—Mr. J. N. Chakravarty, Superintendent of Agriculture, on special duty, continued in charge of the farm up to the 18th May 1917, when he proceeded on two months' leave, and since then I have been in charge of this farm in addition to the Burirhat Farm.

VII.—*Visits.*—The Agricultural Adviser to the Government of India, the Hon'ble Nawab Sir Syed Shamsul Huda, Member of the Bengal Executive Council, and the Commissioner of the Rajshahi Division visited the farm. The Director of Agriculture, the Deputy Director of Agriculture, Eastern Circle, and the Collector of Rangpur paid several visits. The farm was also visited by the Fibre Expert to the Government of Bengal (twice), the Deputy Director of Agriculture, Western Circle (once), and Mr. S. C. Paul, Deputy Superintendent, Civil Veterinary Department (once).

JAMINI KUMAR BISWAS,
Superintendent.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, PRESIDENCY DIVISION, BENGAL, FOR THE YEAR FROM THE 1ST JULY 1916 TO 30TH JUNE 1917.

I SPENT altogether 145 days on tour out of which 19 days were spent outside the division, 14 days being at Chinsurah farm and 5 days at Dacca. The remaining 126 days were spent within the division during which time I was occupied with on—

(1) Jute forecast work;
(2) Demonstration work;
(3) Attending meetings of the Agricultural Associations;
(4) Soil boring;
(5) Seed selection work.

The number of days were distributed as follows:—

	DAYS.
Murshidabad	48
24-Parganas	32
Nadia	21
Jessore	21
Khulna	4
Chinsurah Farm	14
Dacca	5
	145

During the year 1916-17, I was assisted by—

(1) One seed store clerk,
(2) One District Agricultural Officer, Babu Sachindra Krishna Dutt B. AG.
(3) Seven Demonstrators sanctioned by Government, besides
(4) Five temporary men for potato demonstration work and
(5) Nineteen temporary men for four months for jute forecast work;
(6) Two Demonstrators have recently been appointed by the Court of Wards' Estates in the district of 24-Parganas, one by the Janbazar Estate and another by the Gobordanga Estate.

Of the sanctioned number of seven demonstrators, one worked during the whole year and the remaining six commenced work in the winter and started demonstrations with winter crops only.

Jute forecast work.—For this work nineteen temporary men were appointed for four months from the 15th May to the 14th September 1916. These nineteen men checked the Panchayats' figures, by taking actual measurements. The checked area, of course, was not more than 2 per cent. of the total area under jute in this division, but it proved that the Panchayats' figures, in most cases were as correct as could be possible under the present state of affairs. The discrepancy, as I found out from the facts, was not due to any intentional omission on the part of the Panchayats or under-statement of area on the part of the cultivators. In majority of the cases it was due to—

1st.—Cultivators not knowing themselves the exact area of their own plots which are always found to be a few cottahs in excess. This can hardly be rectified before Survey and Settlement work in all the districts is finished or unless we have men enough to measure every plot.

2nd.—Ploughing up of unpromising jute plots to transplant paddy, and also sowing jute late in the season after the panchayats had submitted their figures. Under the present system the date of the preliminary forecast is rather too early for Western Bengal, where on account of the rainfall conditions jute is sown in many places about a month or more later than in Eastern Bengal. This can be avoided to a considerable extent if the date of the forecast is fixed later than it is at present.

Seed store.—During the past year the seed-store for the Presidency Division continued at 27, Upper Circular Road, close to Sealdah Railway Station and conveniently situated for the mofussil people. Altogether 352 maunds 9 seers (about 13 tons) of seeds, 577 maunds 15 seers (about 21 tons) of manure and a few implements were supplied from the store.

Supply of seeds and manures in 1916-17.

Seeds—

	Mds.	srs.	
Indrasal paddy	67	20	
Other varieties of paddy	7	35	
Groundnuts	10	0	
Pulses	6	0	
Dhaincha	14	0	
Jute seed, olitorius	14	20	
Ditto Kakya Bombai	2	0	
Ditto capsularis, ordinary ...	1	20	
Potato, Darjeeling and Nainital ...	228	34	
Total ...	352	9	(13 tons).

	Lbs.	oz.
Papya seeds	4	0
Tobacco seeds	0	4
Sugarcane cuttings ...	15,000	

Manures—

	Mds.	srs.	
Castorcake	497	0	
Bonemeal	58	0	
Superphosphate	13	20	
Sulphate of ammonia	8	35	
Total ...	577	15	(21 tons).

Implements—

Planet Junior Hand-hoe	2
Iron Dōn	2
Meston plough	2
Chain pump	1

Owing to the shortness of the budget grant nothing more could be supplied, although there were demands for larger quantities. The supplying of seeds and manures by private companies through us to the cultivators in credit (to be realised after harvest) did not prove to be satisfactory enough to be continued. But last year, 29 iron ploughs, 2 chain pumps, 8 iron dons, and about 500 maunds (18½ tons) of castorcake were purchased from market by persons who were convinced of the results of our demonstration work.

Supply through Co-operative Credit Societies.

During the year under review no seeds and manures could be supplied through Co-operative Credit Societies as there were no societies in places where our demonstration work continued. Arrangements have, however, been made to take demonstration work in places where Co-operative Credit Societies already exist.

Supply of seeds and manures by the District Boards.

The District Board of 24-Parganas advanced Rs. 500 for supplying seed potatoes and castorcake to cultivators for potato demonstration last year. The demonstration being successful in majority of the places, Rs. 450 were realised and refunded to the District Board.

The Demonstration Work.

The demonstration work in this division has far outgrown the limit of supervision possible with the present staff under me. Requests from various new places came to me to take up demonstration work; but these could not be complied with for want of staff to supervise, as I feared that any failure, that might occur owing to lack of supervision, would produce a very bad effect. For this reason I concentrated my energy to a few important centres and tried to improve the quality of the work rather than to increase the number of plots. The items of demonstration as yet are also very few. This has restricted our scope of work even in places where we have got a firm foothold. This difficulty will not be overcome until experimental farms are started at different places in this division and elaborate research work is taken up with crops and manure suitable for this division. However, the progress of our work during the year under review has been such as can enable us to say boldly that we have won over the so-called conservative cultivator on our side. It is now a question of more research work to enlarge the scope of our activity, more money for demonstration work and larger staff for supervision, to proceed with rapid strides within the range of possibility under the existing conditions of tenancy and social organisations.

Application of manures.

Bonemeal.—We did not get any satisfactory result from bonemeal last year. This was due to want of rains till June which did not allow bonemeal to rot well in the soil. The residual effect of that, however, on crops grown this year on these plots seems to be promising.

Boneash.—The price of bonemeal is gradually becoming dearer, although large quantities of bones are available in the country side and these are either being wasted or shipped to other places for crushing. It is very easy to prepare boneash locally. If boneash is supplemented by some kind of cheap nitrogenous manure, it may prove to be very valuable. Babu Bhujendra Nath Banerji of village Harbaradi, Chooadanga, could prepare boneash last year at an average cost of about ten annas per maund. It has been applied only this year.

Castorcake.—The effect of castorcake on *aus* paddy, *aman* paddy, and jute was very convincing. The growing demand for castorcake from places where we demonstrated and also from the neighbouring villages proves its efficacy beyond any doubt.

Dhaincha greenmanuring.—Owing to late rains last year *dhaincha* could not be sown in proper time.

Experts' selected seeds.

Kakya Bombai jute.—The Fibre Expert's selected Kakya Bombai jute gave good results in village Harbaradi (Chooadanga subdivision). Two maunds (164 lbs) of Kakya Bombai seed have been distributed this year in different places for further comparison.

Indrasail paddy.—Indrasail paddy was tried in two places last year and very satisfactory results were obtained. This year altogether 67½ maunds (2½ tons) of Indrasail paddy have been distributed all over this division, for a wider comparison and final conclusion. The seeds germinated very well and in places where early transplanting was done the tillering habit of the plants attracted the attention of the cultivators.

Selection of seeds on cultivator's fields.—This work is being continued; but from experience I believe that it will take some time to train them in this line of work. They seem to be possessed by an idea of their own about keeping their seeds and they are found too often in confusion. Until the staff is sufficiently increased to make closer supervision possible and Demonstration Farms are started to show how it is actually done and what results are obtained, it will not be possible to make so much progress in this line. The attempt of Babu Jitendra Nath Bose of village Jamalpur, post-office Hadipur (24-Parganas) about selection, in group, of olitorius jute (local) seemed to have produced a successful result, but owing to the cyclone last year the plants kept for seeds were all destroyed. His selection of white-seeded fine *aus* paddy has given him an unmixed variety but it has not been possible as yet to prove definitely its superiority about yield.

The attempt of Babu Kumud Nath Mullik of Ranaghat to keep pedigree seeds of Cucurbits and other vegetables is going to be an important work in this line. He has produced this year some melons (Cucumis momoroica) 27 inches in length, 22 inches girth, the thickness of the fruit-wall being 2 inches.

Plant breeding work.—In 1916, I got permission to take up some systematic seed selection work. To avoid overlapping with the Expert's work already in progress, on jute and paddy, I started with Rahar, the most important of the pulse crops. The reason why this crop has been taken up is that (1) Rahar is a cosmopolitan crop and a very important article of food for common people. It is grown all over the Presidency Division, more particularly in Nadia and the eastern portion of the Murshidabad district. The present average yield of Rahar, in Bengal, however, is not attractive enough to the cultivators to extend its cultivation any further; (2) Cultivation of this crop is so economical and it requires so little attention that if it is made possible to get more profit from this crop, I believe that within a reasonably short time, all the waste high lands that we see in this division at present, may be brought under cultivation without much difficulty.

In 1916, the work was started in Chinsura Farm for preliminary observations with a few plants. In 1917, the seeds of those plants as well as of a few others have been taken to Berhampur Company Bagan for propagation and to find out their stability and prepotency.

After my preliminary observations I fully believe that it may be possible to double the present average yield of Rahar after a few years.

Four pedigreed parents, nine selected plants from ordinary fields and three new varieties are being tried in Berhampur at present.

Selection of local olitorius jute—Has been started this year in Baraset under the guidance of the Fibre Expert.

Introduction of more profitable new crops and better varieties existing crops.

Potato.—Last year was not on the whole a good year for potato crop Owing to late rains in October and November the sowing of potato was very much delayed. Where lands were kept prepared early in the season, very good results were obtained, being in some cases as high as 80 to 85 maunds (about 3 tons) per bigha from Darjeeling variety, and about 60 maunds (2¼ tons) from Nainital variety. But in majority of the cases the average yield was about 40 maunds, (1½ tons), which left a margin of about Rs. 20 per bigha. As the result of our demonstration, the cultivators seem to be very keen about potato growing.

Groundnuts.—The ordinary late variety did not prove to be an economically successful crop, primarily for the high labour charge at the time of harvest. Attempt to grow an early variety of Japanese groundnuts is being made in different places to find out whether we can successfully grow potato after groundnuts. As in that case the cost of raising groundnuts will minimise the cost of preparing the land for potato cultivation.

Bangalore papya.—There was a very large demand for papya seeds last year. The success of Bangalore papya in Jessore attracted the attention of many people in other places as well. But the cyclone destroyed the plants in many places. This year my indent of 4-lbs. of seeds proved to be too scanty.

Thick varieties of sugarcane.—B. 147 and Yellow Tanna grow well but Samsara cuttings being easily available, and at a cheaper rate its cultivation is extending more rapidly than the others.

Agricultural Associations.

The members continued their programmes as usual. Some of the members in the districts of Murshidabad and 24-Parganas did very useful work last year.

Agricultural Exhibitions.

There were two Agricultural Exhibitions last year in the district of Murshidabad, one at Banjetia and another at Kesherpahar. Babu Sachindra Krishna Dutt, the District Agricultural Officer, gave lectures on cultivation of potato and groundnuts, use of castorcake and other manures. Demonstrations in the use of Meston plough, chain pump, iron dons, Planet Junior Hand hoes were given during the show. A series of magic-lantern lectures were also arranged to explain to the cultivators about insect pests and how to check them.

Insect pests.

A serious caterpillar pest on paddy appeared in thana Bagherpara in Jessore district, which totally destroyed the paddy crop in some of the villages and did partial damage in a few other places. Steps were taken to check the pest where the damage was not yet severe; and where the crop was entirely destroyed. I advised the cultivators to make arrangements to grow transplanted *aman* paddy. The Collector advanced money from the Agricultural loan grant and made arrangements for paddy seed.

Insect pests of less serious nature on jute and paddy appeared also in the districts of Nadia and 24-Parganas. Heavy rains and insectivorous birds checked the pest. Dragging kerosinised ropes over the affected plots, as advised by us, was found to be satisfactory to some extent.

H. P. MITRA,

Superintendent of Agriculture,

Presidency Division.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, BURDWAN DIVISION, 1916-17.

Staff.—Under the Divisional Superintendent there were only two District Agricultural Officers and six Demonstaators in the whole division of six districts. The two District Agricultural Officers were stationed in the districts of Birbhum and Bankura, where the demonstration work was the heaviest. Babu Hara Kumar Guha was in Birbhum and Mr. P. G. Krishnan in Bankura. The former was on long leave from the very beginning of the year. Babu Jogesh Chandra Roy officiated for him and considerably increased the demonstration work in the district. Babu Hara Kumar Guha was transferred to Pabna on his return from leave, and Babu Bhabatosh Dutt, District Agricultural Officer of Pabna was appointed to this division. He has been the District Agricultural Officer of Midnapore since last week of April. Babu Jogesh Chandra Roy is temporarily working as the District Agricultural Officer in Birbhum still.

Mr. Krishnan, District Agricultural Officer, Bankura, was granted two months' leave; Babu Santosh Behari Bose, a passed student from Sabour Agricultural College, officiated for him.

Everywhere a large number of people of this division are quite ready to introduce improved methods of agriculture, but for want of adequate number of hands we can scarcely venture to begin our work in new places.

Two Demonstrators were recently engaged—one by the Nayabasan Court of Ward's Estate and another by the Boinchi B. L. Mukherjee's Trust Estate.

Associations.—The Divisional, District and Subdivisional Agricultural Associations tried to help the members in carrying out demonstration work in the usual way. The Birbhum District Agricultural Association has done splendid work in popularising improved methods of agriculture not only among the members but among the cultivators of the district as well. The energetic President helped us a great deal in many ways in discharging our heavy duties in the district of Birbhum. It is very gratifying to note here that the President is arranging to furnish us with a house for office and store and to engage a Demonstrator and also to grant a monthly scholarship of Rs. 10 to an apprentice every year for practical training in the Chinsurah agricultural station from the District Board Fund.

If similar interest be taken in agricultural affairs by other presidents of the agricultural associations in the division, it will undoubtedly be an easy task to make the people understand and adopt the methods shown by our demonstration work.

Exhibitions and Fairs.—There were altogether five exhibitions and *melas* in the division, namely at Suri, Sekedda, Hetampur, Chinsurah and Serampur—the first three in the district of Birbhum and the remaining two in Hooghly. The Suri Mela, the Deputy Director of Agriculture remarked, on the first day of its sitting was the best of its kind in the whole Presidency. Workings of various tools and implements were shown and explained, manufacturing process of gur and cream were shown practically and groundnut cultivation was actually done before the public in a plot of land in the *mela* ground. Lantern lectures explaining scientific and improved agriculture were delivered almost every night; leaflets and pamphlets and charts were distributed; an artificial garden with about 125 varieties of *aman* paddy-bunches, grown in the district by application of bonemeal, *dhaincha* greenmanure, castorcake and sodium nitrate was laid out.

In the Chinsurah Exhibition various demonstrations were done by the Agricultural Department. The stall arranged by the Superintendent, Chinsurah Agricultural station, was a noteworthy one.

Demonstraiion work.—The Superintendent was out on tour for 181 days in the year under report in all the districts of the division. The Superintendent was on leave for four weeks during which period the Deputy Director of Agriculture, Western Circle, did the work in addition to his own duties.

The demonstration work carried out in various districts were mainly :—

1. *Aman* paddy with (*a*) Bonemeal.
   (*b*) Greenmanuring *dhaincha*.
   (*c*) Castorcake.
   (*d*) Sodium nitrate.
   (*e*) Conserved cowdung.
   (*f*) Tank silt.

2. Among other crops the cultivation of groundunt may specially be mentioned here. It drew attention of some of the higher authorities including the Commissioner of the Burdwan Division and the Director of Agriculture, Bengal; the Director personally visited Mr. Majumdar's groundnut plot of 13 bighas at Santiniketan, Bolpur.

3. The other crops tried were foreign sugarcane, namely Mauritius, Tanna, Barbadoes, Ganderi, Vendamukhi.

Potatoes.—Nainital, Darjeeling and acclimatised English Magnumbonum; C. P. Aus, Patnai gram, Rungpur tobacco, Muzaffarnagar wheat, Mr. Finlow's jute, Raipur mustard and Ceylon papya, etc.

4. *Implements.*—Don and chain pump for irrigation, three rollered crushing mill and shallow pan for *gur* making and Planet Junior hoe, Birbhum hoe and Meston plough for tillage.

5. *Seed selection specially of paddy and jute.*—The results of our demonstration work at important centres, shown in the tabulated statements in Deputy Director's report and the report on the store work mentioned below, will give an idea of the heavy work done in the division with a very limited number of subordinate officers. There were about 2,000 bighas

under cultivation according to our prescribed method ; and the area under demonstration work, which is being arranged now for 1917-18 is expected to be 2,500—3,000 bighas of which more than a thousand bighas are for *aman* paddy and bonemeal.

Office and Store.—Babu Bhut Nath Choudhuri was the only clerk for the store as well as the office. The work of office and store has increased so much that one clerk with one durwan is quite insufficient for managing it satisfactorily. The number of letters despatched during the year is 3,000 and the number received is almost the same. The work is increasing every day with the popularity of demonstration work. The services of another clerk and an office peon are indispensably necessary; otherwise timely despatch of seeds and manures to the parties, prompt realisation of fresh and outstanding bills, and keeping systematic records and correspondence are quite impossible.

The provision for supply of seeds and manures at the disposal of the Superintendent being very limited, arrangement was also made to supply the parties with seeds and manures, etc., from various Calcutta firms.

The lists of seeds and manures supplied during the year are given below :—

Names of seeds.	Quantity supplied direct from store.			Quantity supplied from outside firms.			Total.		
	Mds.	Srs.	Ch.	Mds.	Srs.	Ch.	Mds.	Srs.	Ch.
Dhaincha (Sesbania aculeata.)	87	26	4	209	0	0	296	26	4
Paddy (Oryza sativa) ...	41	6	8		.....		41	6	8
Groundnut (Arachis hypogœa).	50	39	0	10	20	0	61	19	0
Wheat (Triticum sativum).	12	27	0	43	17	0	56	4	0
Potatoes (Solanum tubersoum).	4	20	0	222	34	0	227	14	0
Other seeds ...	22	24	8	51	13	2	73	37	10
Total ...	219	23	4 (8 tons.)	537	4	2 (20 tons.)	756	27	6 *i. e.* 28 (tons).

The number of sugarcane cuttings (Mauritius, Barbadoes, etc.,) supplied from agricultural stations of Chinsurah and Burdwan is 19,000.

Implements distributed—55.

Names of manures.	Quantity supplied direct from store.			Quantity supplied from outside firms.			Total.		
	Mds.	Srs.	Ch.	Mds	Srs.	Ch.	Mds.	Srs.	Ch.
Bonemeal	40	20	0	1,388	30	0	1,379	10	0
Castorcake	260	23	8	229	0	0	489	23	8
Sodium nitrate ...	12	30	0	30	0	0	42	30	0
Sulphate of amonia ...	7	0	0		.....		7	0	0
Superphosphate ...	6	0	0		.....		6	0	0
Sulphate of potash ...	0	14	0		.....		0	14	0
Total ...	327	7	8 (12 tons).	1,647	30	0 (60 tons).	1,924	37	0 (72 tons).

Excluding the account of potato seeds for which a special arrangement was made at Darjeeling from the Department, the expenditure and receipts during the financial year 1916-17 are shown below under separate heads :—

		Rs.	A.	P.	
Expenditure :—					
Seed	... ...	481	9	5	
Manures	... ...	1,004	11	3	} Including Rs. 650 from Demonstration grant.
Implements	...	1	15	6	
Contingencies	...	261	8	6	
Total	...	1,749	12	8	
House rent	...	840			

Divisional staff and Superintendent's Office contingencies, Rs. 585-10 :—
Receipts :—

		Rs.	A.	P.
Seeds	... ...	610	12	3
Manures	... ...	1,007	9	0
Implements	... ...	187	12	0
Total	...	1,806	1	3

Special work.—Like the famine work in Bankura of the last year there was flood duty in Birbhum this year. The Collector and President, District Agricultural Association, Birbhum, provided the divisional store with a sum of nearly Rs. 1,000 for distributing seeds of *rabi* crops among the flood affected cultivators of the district. The District Agricultural Officer of Birbhum and the Demonstrator of Bolpur Centre worked hard in connection with this flood duty.

The jute forecast work was carried out by the Divisional Superintendent of Agriculture; he was helped by 13 temporary clerks in the jute growing districts of Hooghly, Howrah, Burdwan and Midnapore.

The names of the following gentlemen require special mention; they really take very keen interest in agriculture and they have already commenced work in right earnest by introducing improved methods of agriculture among the cultivating classes :—

Mr. N. C. Sircar of Baliarpur (Burdwan)
Babu Gopal Chandra Dutt, Bentir (Burdwan).
Babu Aghore Nath Mukherji, Nadiha (Burdwan).
Mr. Abinash Chandra Banerjee, Sultanpur (Birbhum).

Thanks are due to the Superintendent of Agricultural Farm, Burdwan, who has arranged demonstration work in about three or four hundred bighas of land belonging to several gentlemen of the district of Burdwan, where there is no District Agricultural Officer at present.

J. N. SARKAR,
Superintendent of Agriculture,
Burdwan Division.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, DACCA DIVISION, FOR THE YEAR 1916-17.

Staff.—The staff consists of one Superintendent, four District Agricultural Officers and 34 Fieldman Demonstrators (31 paid by the Government and three paid by the Court of Wards' Estates in Bakarganj District). For seed distribution (jute and paddy) and *ufra* survey works, 26 temporary men have been in employ since November last.

Tours.—The number of days spent by the officers on tour and the principal places visited are noted below :—

Name and designation of the officer.	Number of days spent on tour.	Names of important places visited.
Babu Rajeswar Das Gupta, Superintendent of Agriculture, Dacca Division.	302	Calcutta, Goalundo, Rajbari, Faridpur, Narayanganj, Kaoraid, Manipur, Kistapur, Mymensingh, Kasipur, Khulna, Darjeeling, Batasia, Ati, Taltolla, Mirkadim, Munshiganj, Kalatia, Jinjira, Keraniganj, Godenail, Madaripur, Saidpur, Chandpur, Alubari, Kalma, Dhankunia, Tarpassa, Rampal Sarisabari, Singjani, Bahadurabad, Outshahi, Arial, Fulbaria, Kurmitollah, Rangpur, Chittagong, Govindpur, Gopalpur, Barisal, Mautail, Balda, Bahar, Kalagachia, Jaidebpur, Sripur, Kapasia, Kaliganj, Pubail, Hooghly, Chinsura and Rajshahi.
Babu Santi Prosad Sen Gupta, District Agricultural Officer, Dacca.	231	Narayanganj, Baradi, Baiderbazar, Rupganj, Nagari, Raipura, Ramnagar, Daulatkandi. Narsingdi, Fatulla, Godenail, Munshiganj, Lohaganj, Tangibari, Dhankunia, Kalma, Kola, Bharakar, Kumarbhog, Kajirpagla, Malkhanagar, Serajdigha, Srinagar, Ichhapura, Samsiddhi, Mirkadim, Solaghar, Kusumpur, Manikganj, Aricha, Jelaldi, Lesraganj. Natakhola, Kanchanpur, Singair, Savar, Mirpur, Ati, Kalatia, Pubail, Jaidebpur, Kaliakoir, Boleadi, Tangi, Kaliganj, Ghorasal, Sripur, Kaoraid, Kapasia and Kurmitollah.
Babu Satindra Lal Sen, District Agricultural Officer, Mymensingh.	296	Jamalpur, Kishoreganj, Tangail. Netrokona, Gopalpur, Madhupur, Muktagacha, Iswarganj, Fulpur, Fulbaria, Nikli, Haluaghat, Gauripur, Bhairab, Bajitpur, Sarisabari, Nandail, Senbari, Gafargaon, Hussainpur, Ramgopalpur, Serpur, Bidyaganj, Kalirbazar, Piyarpur, Dapunia, Katlasen, Kanihari, Ramamritganj, Sutiakhali, Montola, Kursha, Shaltia, Islampur, Dewanganj, Nandina, Narundi, Ranarampur, Dhalla, Bahadurpur and Atharabari.
Babu Debendra Nath Mitra, District Agricultural Officer, Faridpur.	262	Bhanga, Sadarpur, Bhusna, Dhobaghata, Joynagar, Kanaipur, Sadipur, Rajbari, Dadshi, Khabilpur, Udaipur, Basantapur, Banibaha, Belgachi, Beliakandi, Jajtra, Goalundo, Nooria, Madaripur, Dudkhali, Charmugria, Ghatmaji, Panchkhola, Kulpaddi, Haridaspur, Gopalgauj, Khatra, Pitabari, Olpur and Madhupur.
Babu Surendra Nath Sen, District Agricultural Officer, Barisal.	239	Bhola, Perojpur Patuakhali, Daulatkhan, Khantakhali, Mehendiganj, Bakal, Rahamatpur, Gournadi, Gaila Rakudia, Muladi, Sarikol, Wazerpur, Sakrail, Sikerpur, Batazore, Kakchera, Bainchatki, Patherghata, Charmadid, Badulpara, Bhandaria, Baisari, Dabansara, Bejoypur, Jhalakhati and Swarupkati.

Demonstration work.—The principal lines of work are as follows.

1. *Introduction of superior varieties of seeds selected by the Expert Officers.*—The superiority of Indrasail paddy and Kakya Bombai jute over the varieties commonly grown by the raiyats in the Division has been established. Demonstrations indicating the superiority of Kakya Bombai jute over local varieties are, however, being still continued at the request of Messrs. Sinclair, Murray & Co. and Landale and Clarke, Limited, at Narayanganj, Godenail, Mymensingh, Sarishabari, Elashin and Charmugria in plots specially leased for this purpose. The results of this year's trials are as follows :—

District.	Number of plots.	Area of land in acres.	Difference of outturn in	Outturn per acre.
			lbs.	
Dacca	4	1·13	222	...
Mymensingh ...	20	1·92	390	...

Recorded trials of Mr. Hector's Dacca selected paddy over local varieties in the hands of cultivators are as follows:—

District.	Number of plots.	Area of land in acres.	Difference of outturn in lbs.	Difference of outturn per acre in lbs.
Dacca	84	44·18	13,486	306
Mymensingh ...	80	36·66	14,924	414

The demand for these seeds has risen beyond the resources of the Department. Cultivators are, therefore, being supplied with just enough seeds to grow their own requirements next year on the following principle.

The annual seed requirements of an ordinary cultivator in the Division is about 5 seers (10 lbs) of jute and 1½ maunds (120 lbs) of paddy taking his average holding to be 15 bighas (5 acres) (3 or 4 bighas of jute and 11 or 12 bighas of paddy). This he can easily grow by reserving the crop of about a katha ($\frac{1}{60}$th acre) of his jute and 4 kathas ($\frac{1}{15}$th acre) of his paddy land. One katha of jute land needs only 5 tolas of seed and 4 kathas of paddy land requires one seer (2 lbs) of seed. But to provide against contingencies and also to enable the cultivator to harvest a part of his crop for ordinary purposes he has been given 10 tolas (¼ lb). of jute and 5 seers (10 lbs.) of paddy seeds in small bags. From these he will get about 10 seers (20 lbs.) of jute and 10 maunds (820 lbs.) of paddy seeds which will not only suffice for his own requirements next year, but allow him to sell some, if he likes. On this principle during the year under report 100 maunds (3⅔ tons) of jute seed in 32,000 small cloth bags and 2,000 maunds (73⅓ tons) of paddy seed in 16,000 small gunny bags have been distributed in the districts of Dacca and Mymensingh. Next season this principle will be followed in other districts also and as much as 1,500 maunds (55 tons) of jute and 6,000 maunds (220 tons) of paddy will thus be distributed among cultivators.

2. *Effect of bonemeal and lime on red laterite soils.*—The advantage of using bonemeal and lime on these soils has been demonstrated. The raiyats are now quite convinced of the value of these manures. Progress, however, is rather slow for want of ready money for purchase of the manures. Much depends on the Co-operative Department and zemindars who would do well to help in ameliorating the condition of their members or tenants. The District Agricultural Officer, Dacca, reports a net profit of about Rs. 27 per acre on an average from the use of bonemeal.

3. *Residual effect of bonemeal.*—The effect of bonemeal is cumulative. Fields that received bonemeal in 1915-16 were again kept under observation and a net profit of Rs. 28-8-9 per acre on an average has been recorded as—

District.	No. of plots.	Area of land in acres.	Outturn in lbs.	Difference of outturn in lbs.	Profit per acre.
					Rs. A. P.
Dacca	8	5·66 5·66	11,658 7,261	4,397	28 8 9

During the year under report, about 600 maunds (22 tons) of bonemeal have been sold to the people in this Division. Demonstrations to prove the value of bonemeal as a manure are being conducted in new areas.

4. *Introduction of potatoes.*—The potato crop is making satisfactory progress in the Division and will doubtless take a permanent place in the *rabi* crop.

The chief difficulty in the extension of this crop as in the case of manure is the need of capital. Fortunately cultivators are being helped as much as possible by some enlightened land-owners, Court of Wards' Estates and Central Co-operative Banks; amongst the former the Hon'ble Kumar Arun Chandra Sinha advanced Rs. 500 for the supply of seeds to his tenants at Beliakandi Circle of Faridpur District. He also agreed to bear any loss that might arise from failure of the crop. There were, however, no failures.

Satisfied with last year's results, he has promised to advance Rs. 1,000 this year for further expansion of potato cultivation in his estate. The Bakarganj Court of Wards' Estates gave Rs. 2,000 last year and have promised a similar sum for this year. The amounts kindly advanced by the Central Co-operative Banks in the Division for the benefit of members of their rural societies are noted below :—

		Rs.
Dacca Central Co-operative Bank	... ...	4,000
Mymensingh ditto	... ...	3,000
Faridpur ditto	... ...	3,000
Madaripur ditto	... ...	720

A summary of outturns of potato fields under observations are as follow :—

District.	Number of cultivators.	Total area in acres.	Average outturn per acre in lbs.
Dacca	310	67·4	8,170
Mymensingh	330	57·3	10,243
Faridpur	450	33·0	9,600
Barisal	243	29·1	3,546

5. *Introduction of superior varieties of sugarcane.*—Through the efforts of the Department several varieties of sugarcane have been introduced. Innumerable applications are received for supply of cuttings of these varieties, but it is not possible for the Department to meet this demand. It has, therefore, been decided to distribute these cuttings on the same principle as has been adopted with jute and paddy, viz., the restriction of the total amount issued to any one person.

6. *Introduction of new crops.*—Transplanted paddy has hitherto been practically unknown in Faridpur District, but through the exertions of the District Agricultural Officer successful trials have been made in several places and an average outturn of 30 maunds (2460 lbs.) per acre has been secured. The cultivation of *boro* paddy in Faridpur District and of deep-water aman paddy in Bakarganj is gaining ground. Groundnut and tobacco have also been tried with success. Successful demonstrations have been made with English vegetables and arrangements have been made for the supply of 25,000 packets of these seeds for this year.

7. *Implements.*—Demonstrations with Planet Junior Hand Hoes for interculture in garden crops with small iron-ploughs for more thorough ploughing and with the spring toothed harrows for cheap and effective preparation of the land are being greatly appreciated. The keen interest taken by cultivators is promising. Orders for these implements are being received from several places.

8. *Miscellaneous.*—(*a*) *Ufra experiments.*—Stubble burning as a remedial measure is being advocated and was again tried with some success. The Director hopes that the evil might be altogether obviated by changing the crop or the method of cultivation and with that object in view some of this class of land will be tried next season with *boro* paddy, jute and early *aus* paddy.

(*b*) *Water Hyacinth.*—Experiments in the Dacca Farm have shown that the ash of this weed is a very good manure for jute. Demonstrations on a large scale are being given on cultivator's fields in the Dacca District. Up to date, about 20,000 maunds (733 tons) of this ash (which may be taken to have killed 2,000,000 maunds (73,333 tons) of the green stuff) have been purchased by Messrs. Shaw, Wallace & Co. of Calcutta. The preparation of the ash from the green stuff is quite an easy matter. The plants should be collected

in the winter season, dried and burnt. Many people have started using the dry hyacinth as fuel and selling the ash for manurial purposes.

(*c*) *Exhibitions.*—The Faridpur Agricultural and Industrial Exhibition was held in January Practical demonstrations on *gur* making, cheap and effective interculture with the help of Planet Junior Hand Hoes, better ploughing with iron-ploughs were given. A plot of ground had been previously laid out at the expense of the Exhibition Committee and excellent crops of potatoes, tobacco, cabbage, tomato, onion, peas, etc., were grown as field demonstrations. In addition, five shows were held in Mymensingh, Jamalpur, Gopalganj, Madaripur and Rajbari, mainly to encourage the cultivation of potatoes. Prizes in the shape of medals, cash and certificates were awarded.

9. *Seed Store.*—During the year under report, the following seeds and manures have been sold by the Divisional Seed Stores—

	Mds.	sr.	ch.
Bonemeal	1,071	15	8
Wheat	1	0	0
Lime	435	0	0
Castor-cake	9	30	0
Jute seeds	268	17	0
Paddy seeds	1,929	19	0
Dhaincha	25	10	0
Sunn-hemp	20	20	0
Pulses (different varieties)	56	0	0

An interesting feature is that all the money spent on seeds, manures, etc., have been returned to the Treasury.

10. *Acknowledgement.*—Our best thanks are due to the District Administration staff, to the Collectors, Subdivisional Officers, Circle Officers, the Secretaries and the Chairmen of Central Banks; to the General Manager, Bakarganj Court of Wards' Estates, for their kind help and co-operation. Special thanks are due to the Hon'ble Kumar Arun Chandra Sinha for the great and practical interest in the work of the Department. The District Agricultural Officers deserve special commendation for their untiring zeal and loyal devotion.

R. Das Gupta,

Superintendent of Agriculture,
Dacca Division.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, RAJSHAHI DIVISION, FOR THE YEAR 1916-17.

During the year 1916-17, Babu Hara Kumar Guha was the District Agricultural Officer of Pabna and Babu Benode Lal Mukherjee, the District Agricultural Officer of Malda. The district of Rangpur was not under my charge during this year.

I was out on tour for 302 days, the District Agricultural Officer of Malda for 200 days and the District Agricultural Officer of Pabna for 312 days. All the other subordinate officers were also constantly on tour. There were only five demonstrators in the division.

During this year there were altogether 13 centres of demonstration, viz., Rajshahi, Naodapara, Ishubpur, Nattore, Bogra, Joypurhat, Jalpaiguri, Ryganj, Malda, Godagari, Pabna, Bharenga and Serajganj.

The items of demonstration were as usual:—(1) The effects of Bonemeal, (2) the superiority of the Darjeeling and Nainital varieties of potato seeds

to the local, (3) green manuring of potatoes with cowpeas, transplanted paddy with Dhaincha, jute with sunnhemp, etc., (4) manures, *e.g.*, castor-cake with potatoes and sugarcane, sodium nitrate with any crop requiring forcing up and specially with vegetables, (5) conservation of cattle-dung, (6) introduction of the better varieties of sugarcanes among cultivators, (7) distribution of the seeds raised by experts, (8) fodder crops, (9) introduction of new crops, manures and implements.

(1) Bonemeal.

The manure has been carefully tested throughout the division, but has been successful only in the red soil tracts. The use of this manure for fruit trees is gradually increasing. Lime has been used in some places with this manure for jute.

It has been conclusively proved in this division that this manure will be very successful for transplanted winter paddy only in places like Bogra, Joypurhat, Dinajpur and the Northern part of Malda. For fruit trees, however, this manure is cousidered the best and the cultivators and specially the fruit growers of Malda and Rajshahi are convinced of this.

(2) Potatoes.

During the year under review the demand for seed potatoes exceeded all expectations. There was demand for nearly 1,200 maunds (44 tons), but Icould supply only 700 maunds (25¾ tons) myself. The balance was arranged by cultivators themselves and every effort was done to help them in the cultivation of this crop.

Records were only kept of 179 plots in places where the crop had not yet been thoroughly established. The yield per bigha in these plots ranged from 40 to 85 maunds (3,280 lbs to 6,800 lbs.) and the crop was a commercial success all through the division. The high price of seed is standing in the way of a very rapid expansion which could otherwise be expected.

A number of careful records have been kept which may be of interest.

Potato.—Grown side by side on uniform plots and equally treated so far as cultivation and manuring are concerned. Average of four sets of plots :—

	Darjeeling.	Nainital.	Deshi.	English potato, Magnum Bonum, etc.
Yield per acre in lbs. ...	16,482	12,792	7,134	13,284
Keeping qualities ...	Fair	Medium	Best	Medium
	Rs. A.	Rs. A.	Rs. A.	Rs. A.
Average price per maund (82 lbs).	1 14	2 1	3 6	2 1
Total price ...	142 6	107 4	97 14	107 4
Cost of cultivation (approximate).	60 0	54 0	49 0	60 0
Net gain	82 6	53 4	48 14	47 4

The difference in the cost of cultivation is due to the cost of seeds and the number of waterings required. The Deshi was watered twice; the others thrice.

Castor-cake has been proved to be the best manure for potatoes. In many cases nearly 1,722 lbs. to the acre have been used with quite good results. Green manuring with cowpea supplemented by 492 lbs. of castor-cake per acre has held its own against plots manured with 1,476 lbs. of castor-cake only.

Average of 8 plots of $\frac{1}{6}$ acre each.

		Yield.	Cost.
No. I.		LBS.	Rs.
Average of 4 plots...	Green manuring and 492 lbs. of castor-cake per acre and a small quantity of cowdung.	5,272	7
No. II.			
Average of 4 plots...	1,476 lbs. of castor-cake only and an equal quantity of cowdung as mentioned in No. I.	5,140	18

Castor cake at Rs. 3 per maund (82 lbs.).

(3) Green manuring.

Green manuring of the aman paddy with dhaincha and that of the potatoes with cowpea is gradually increasing. During the year under review nearly 3,526 lbs. of dhaincha seed (enough for 133⅓ acres of land) and about 5,904 lbs. of cowpea (enough for 266⅔ acres of land) were supplied to the public. The cowpea in addition to being used as a green manure is also used as a fodder crop and a crop for producing "dal" for human consumption and hence its special advantage and demand.

(4) Manures recommended specially.

(1) Castor-cake for sugarcanes, potatoes, vegetables, etc.
(2) Bonemeal for fruit trees.
(3) Nim-cake for plots infested with white ants.
(4) Nitrate of soda, for vegetables, mulberry plants.
(5) Lime in lands with acid reactions.

(5) Conservation of Cattle dung.

Conservation of cattle-dung in covered pits is being encouraged. The addition of a small quantity of bonemeal to every day collection is also recommended as in previous years.

(6) Sugarcane.

During the year 1916-17 nearly 75 thousand of cuttings were distributed. The cuttings were obtained from the farm or from the cultivators who had grown this crop from cuttings obtained from our department in previous years. The variety of vendamukhi is extending more rapidly than the other varieties as it is a local cane and hence specially adapted to the climatic needs of this division. It is also drought-resisting. Besides this it is a cane that may be used for chewing and gur making equally well. B. 147, B. 208 and ganderi are considered the best for chewing purposes, but are used to a comparatively limited extent. In places infested by pigs, jackals and thieves the thicker varieties, viz., yellow and striped tanna are the best. The only drawback of these canes is that they are very hard and cannot be used for chewing; this fact also gives rise to another trouble, viz., that they have to be cut into two before being put into the mill or else the mill is broken. I am, however, corresponding with some mill-owners so that they make a mill to suit this cane in case the cultivation expands sufficiently.

The average yield of *gur* from the varieties recommended above is about 75 to 100 per acre according to local circumstances, as against 2,952 to 4,510 lbs. per acre with the kheri canes.

(7) Distribution of seeds as raised by the Economic Botanist and Fibre Expert on single line culture.

(*a*) *Jute, Kakya Bombai.*—This jute has been tried in Serajganj, Jalpaiguri, Siliguri, Bogra, Khanjanpur and Malda. In Serajganj the crop grown from this seed was marvellous. In all places where capsularis is grown this seed is superior to that of the cultivators. But in this division, in many places the olitorius variety is mainly grown.

(*b*) The Indrasail paddy seed was tried in many places and the results have been uniformly good. On an average an increase by 123 lbs. to 164 lbs. of paddy per bigha (⅓ of an acre) with this seed is obtained over that grown from ordinary seeds. The variety is drought-resisting. The paddy has another special advantage, viz., it gives a good quality of rice, and in addition gives very good "moori" and "khoyee"—a combination of quantities rare in any single variety.

We have during the current season distributed nearly 10,660 lbs. of the Indrasail paddy seeds to cultivators throughout the division and testing it carefully against the local varieties. The results will be obtained in December.

(8) Fodder crops.

Increasing attention is being given to this most important question. At present there is a tendency among the public to think that the only panacea for the improvement of cattle is the preserved grazing lands. Every endeavour has been made to make it clear that the idea is fallacious and that growing fodder crops are more economical than the preservation of grazing grounds. In eleven centres, care has been taken to demonstrate the utility of juar, gahama, cowpea, kheri-cane, bazra, kali kalai, khesari, as fodder. Grass seeds and turfs have been supplied to some cultivators wishing to lay out pasture lands.

(9) New crops and manures.

(*a*) *Onions.*—As in previous years the huge profit from these crops has been shown in eight places. Patna onion sets and two other foreign varieties had been tested with good results. Six to seven maunds (492 to 574 lbs.) of castor-cake has been recommended as the best manure for this crop.

(*b*) Much attention has been paid to the introduction of vegetable crops *e.g.*, cabbages, cauli-flowers, Indian vegetables, to new places.

(*c*) The districts of Rajshahi, Malda, Dinajpur and Bogra grow excellent fruits, *e.g.*, mangoes, jack-fruits, lichi, plantain, papya, custard apple, etc. Grafts have been carefully supplied to the public from known trees. Nearly 3,000 grafts and plants have been supplied to the public this year.

(*d*) Many different kinds of plantains are being tried all through the division. Martaban, champa, safri, kabuli, curry plantain and amritasagar have been proved to be the best. A number of plantain gardens have been laid out by us.

(*e*) Chittagong Hill kochu, Santragachi ole, Raipur mustard, Pusa wheat, Chittagong arhar have been introduced by us and the demands for these seeds are gradually increasing.

(*f*) In many mango gardens of Malda the cultivation of turmeric in the interspaces has been tried with success. The trees themselves are also benefitted by this interculture and the application of the necessary quantity of manures.

Implements.

The use of the Planet Junior Handhoe, Knapsack Sprayer and Done has been demonstrated to cultivators in many places. The plough designed by Mr. R. Das-Gupta of the Dacca Division has been carefully tested in many places in the districts of Rajshahi, Bogra and Jalpaiguri and has given satisfaction to the cultivators. It can be drawn by a pair of ordinary bullocks.

General.

My best thanks are due to the divisional and the district authorities who have helped me to the best of their powers in our departmental work. Without their co-operation nothing could be done by me. My best thanks are also due to the Members of those District Boards who have promised to help us with money for the improvement of agriculture, to the members of the Malda Agricultural Association and also to Babu Romesh Chandra Das, Manager, Churamon Ward's Estate, Babu Bejoy Krishna Sen, Manager, Joypurhat Khash Mahal Estate, the Hon'ble Babu Kishori Mohan Choudhury of Rajshahi, Babu Jagadindra Deb Raikat of Jalpaiguri, Muhammad Ibrahim of Bogra, Babu Jogendra Nath Sarkar of Bogra, and Ershad Ali Khan Choudhuri of Nattore.

My special thanks are also due to the officers of the Co-operative Department who have helped us to a very great extent and to the Secretaries of the Central and Rural Societies. A spirit of hearty co-operation exists between these two departments.

The Divisional Seed Store.

The work of this section went on briskly during this year. The following were supplied to cultivators through this Store :—

Name of articles.	Quantity or number.	Price. Rs.	A.	P.
Dhaincha	... 8 maunds 25 seers	85	13	0
Cowpea	... 13 „ 21 „	111	0	0
Arahar	... 33 „ 10 „	133	8	0
Groundnut	... 1½ „ ...	15	0	0
Nitrate of soda ...	... ...	16	0	0
Aus paddy	... 12½ maunds ...	50	0	0
Tobacco seed ...	... 6 tolas ...	2	0	0
Galvanized seed bins ...	... 17 (No.) ...	428	4	0
Ploughs	... 5 „ ...	25	0	0
Bonemeal	... 70 maunds ...	211	1	3
Grafts	... 180 (No.) ...	366	0	0
Gas generator for Magic Lantern	... ...	4	8	0
Lime	... 1½ maunds ...	1	8	0
Copper sulphate ...	... ...	0	10	0
Pulses	... 37 maunds 20 seers	150	0	0
American onion seed ...	... 3 tolas ...	4	8	0
Patna turnip seed ...	... 1 oz. ...	0	9	0
Johnson grass seed ...	... 2 lbs. ...	4	10	0
Nitrosira Co. manure ...	... 16 lbs. ...	3	12	0
Matikalai seed ...	... 4 maunds ...	17	0	0
Nim-cake	... 1½ „ ...	8	12	0
Wheat seed	... 3½ „ ...	14	0	0
Marua seed	... ½ „ ...	3	0	0
Rangpur seed potatoes ...	... 2 maunds ...	16	0	0
Miscellaneous ...	... ...	5	8	0

The above is a list of stores purchased by the Divisional Seed Store Rajshahi, from the Government grant of Rs. 1,870 for the year 1916-17.

List of articles purchased by parties through the Divisional Seed Store, Rajshahi, but not paid from the Government grant during the year 1916-17.

Paddy	50	maunds.
Jute seed	13	„
Sugarcane cuttings	79,000	(No.).
Cowpea	73	maunds.
Dhaincha	12	„
Pulses	71	„
Fodder crops	8	„
Indian-corn	1	maund.
Groundnut	13	maunds.
Bonemeal	100	„
Potatoes	200	„
Red potatoes	5	„
Castor cake	32	„
Mango grafts	950	(No).
Lemon grafts	350	„
Lichi grafts	275	„
Miscellaneous grafts	1,200	„
English vegetables	125	rupees.

N. GUPTA,
Superintendent of Agriculture,
Rajshahi Division.

ANNUAL REPORT OF THE DEMONSTRATION WORK OF THE SUPERINTENDENT OF AGRICULTURE, CHITTAGONG DIVISION.

During the course of the year, I remained in charge of the Division with 10 Fieldmen Demonstrators under me, who were placed in their respective home-unions. The following list shows their distribution by thanas and subdivisions as it stood on the 1st July 1916 :—

District.	Subdivision.	Thana.	Number of Demonstrators.	Remarks.
Tippera ...	Sadar ...	Homna ...	2	One was dismissed for false personification.
		Burichang ...	1	Placed in famine relief work at Feni.
	Chandpur	Faridganj ...	1	Ditto. Ditto.
		Matlab ...	1	
Noakhali ...	Sadar ...	Sudharam ...	3	Placed in famine relief duty at Feni.
		Companyganj	1	Placed in famine relief duty for a few months.
Chittagong ...	Do. ...	Sadar ...	1	
		Total ...	10	

Besides the above, we had three Demonstrators working at Brahmanbaria, who were paid by the Sarail Ward Estate. They were employed for six months during the potato season.

I was out on tour for 285 days in course of the year. Great difficulty was experienced for the want of District Agricultural Officers.

Work.

The most important work carried on was—

(1) Trials of manures for paddy.
(2) The introduction of potatoes as a *rabi* crop.

Amongst the other works may be mentioned the introduction of the system of single seedling transplantation which is being slowly extended in Noakhali.

As regards implements, we have not been able to impress the raiyat with anything within his purchasing power and within the capacity of his bullocks to draw.

The following table shows the progressive increase in the sale and distribution of bonemeal in the districts under my charge:—

District.	Quantity distributed in—				
	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.
	Ton cwt. lb.	Ton cwt. lb.	Ton cwt. lb.	Ton cwt. lb.	Ton cwt. lb.
Noakhali ...	0 8 88	1 1 108	5 1 86	29 17 62	7 11 72
Chittagong ...	0 8 88	0 7 36	0 17 105	0 0 82	0 12 21
Tippera ...	1 1 108	2 7 66	3 6 70	1 15 16	1 12 54

With one Demonstrator it has become impossible to keep reliable records of the outturns. The average quantity supplied to the cultivators is four maunds (328 lbs.), the lowest being one maund (82 lbs.) and the highest being 20 maunds (1,640 lbs.) to an individual cultivator.

We have not been able to find out a suitable manure for Chittagong, Chandpur and Brahmanbaria and other parts of the district of Tippera.

Potatoes were very successfully grown in Fatickchari, Chittagong, where the average outturn was 5 tons per acre of imported Darjeeling potato an d4½ tons of the Nainital variety. The best results were obtained in Fatickchari where irrigation may be done at a very small cost by simply damming up the innumerable hill streams. Part of Brahmanbaria will also prove suitable to the crop. In Munshirhat centre, Noakhali, the crop was tried for the first time and was grown as a mixed crop. The crop in Noakhali was not very good this year owing to late sowings due to floods.

Trials are being conducted in the various centres of my division with Dacca Indrasail paddy and the comparative results are eagerly awaited.

The Kakya Bombai jute is being tried through the jute agencies this year as well. The reports were submitted direct to the Fibre Expert and hence are not included here.

D. DUTTA,

Superintendent of Agriculture,
Chittagong Division.

ANNUAL REPORT OF THE FIBRE EXPERT TO THE GOVERNMENT OF BENGAL FOR THE YEAR ENDING 30TH JUNE 1917.

Charge.

I have held charge of the Fibre Expert's section throughout the year under review. I have also been in charge of the office of Mr. Hector, Economic Botanist, who was on furlough throughout the year and, since the departure of Mr. Annett on deputation to the United Provinces, I have acted as Agricultural Chemist.

Tours.

Eighty-eight days were spent on tour as follows :—

Date.	Name of place.	Purpose.	Total number of days.
16th June 1916	Godnail	To inspect the Naraingunge Company's jute plots.	1
3rd July ,, to 6th ,, ,,	Calcutta and Chinsurah ...	To inspect varietal test plots and to meet Director of Agriculture.	4
23rd ,, ,, to 25th ,, ,,	Calcutta	To attend Provincial Agricultural meeting.	3
2nd August ,, to 14th ,, ,,	Mymensingh, Sarisabari, Saidpur, Jalpaiguri and Calcutta.	To inspect experimental jute plots ...	13
14th September ,,	Punjab	To discuss cultivation of fibre crops...	13
26th ,, ,,	Pusa, Dholi, Dalsinghsarai, Chinsurah and Calcutta.	To inspect experimental jute plots ...	
29th ,, ,, to 8th October ,,	Haldibari, Jalpaiguri and Kumarikhatta.	To inspect jute plots	10
4th November ,, to 8th ,, ,,	Chinsura and Calcutta ...	Ditto	5
7th December ,, to 9th ,, ,,	Calcutta	To discuss experimental jute plots with Mr. Suttie.	3
11th ,, ,, to 13th ,, ,,	Tangi and Pubail ...	In connection with Ufra work ...	3
7th January 1917 to 21st ,, ,,	Calcutta, Pusa, Dholi, Muzafferpore, Dalsinghsarai, Muktapur, Rosera and Chinsurah.	To make arrangement for the despatch of jute seed and to make arrangements for cultivation of jute for seed.	15
11th February ,, to 22nd ,, ,,	Kumarikhatta, Khagrabari, Nalbari, Rangpur and Calcutta.	To visit Messrs. Birkmyre Bros'. jute estate and to select land for growing jute.	12
		Total ...	88

In addition to the above, I spent 12 days in camp with the Eastern Bengal Volunteer Rifles from the 27th January to the 9th February 1917: also I spent three weeks from April 8th till April 27th, 1917, at an officer's class in Calcutta.

Manures for jute on acid red soils.

Effects of green manure.—For several years it has been shown in these reports that lime and phosphate can be very profitably applied to the red soil of the Madhupur jungle tract. In 1915, a series of plots was laid down to investigate, in collaboration with the Deputy Director of Agriculture, the effect of green manure on limed and unlimed land. Dhaincha (*sesbania aculeata*) was the green manure crop used. The series consisted of 16 plots, half of which received 30 maunds (2,400 lbs.) of slaked lime and 3 maunds (240 lbs.) of bone-meal per acre. In 1915, eight plots comprising an equal number of limed and unlimed plots grew Dhaincha as green manure, and jute was sown in the remainder, 40 lbs. of Nitrogen per acre being applied in the form of castor cake to the latter. The yields of this jute crop, which were given in last year's report, confirmed previous results on the effect of lime on jute, and averaged nearly 6 maunds of fibre per acre in favour of the lime. This is equivalent to an increased net profit, after paying for all manures of Rs. 29 per acre.

The whole series was available for jute in 1916, and each plot received 40 lbs. of nitrogen as castor cake. Each plot was also given half a maund per acre of nitrate of soda as a top dressing to the young crop. The results are as follows :—

Crop, 1916.

Green manured.				Not green manured.			
Lime and bone in 1915.		No lime and bone.		Lime and bone.		No lime and bone.	
Plot No.	Yield per acre.	Plot No.	Yield per acre.	Plot No.	Yield per acre.	Plot No.	Yield per acre.
	Mds. s.		Mds. s.		Mds. s.		Mds. s.
1	19 23	2	12 39	5	12 15	6	0 21
3	16 23	4	12 24	7	8 7	8	0 24
13	16 2	14	8 37	9	12 33	10	5 37
15	13 32	16	8 34	11	6 12	12	4 32
Means ...	16 20	...	10 34	...	9 37	...	2 29

N.B.—One maund =40 seers=80 lbs.

The green manured plots are strictly comparable and they show that the effect of lime was to produce nearly the same increased yield of fibre as on the non-green manured plots in 1915, viz.:—6 maunds (480 lbs.) per acre.

In order to estimate the effect of green manure it must be remembered that the first crop of jute was grown on the non-green manured land in 1915. It is, therefore, necessary to compare the mean yield of fibre from the non-green manured area in 1915 with that of the green manured area in 1916. The latter yields are given above ; the former were as follows :—

Non-green manured area yields in 1915.

Lime and bone.			No lime and bone.		
Plot No.		Yield per acre.	Plot No.		Yield per acre.
		Md. s. c.			Md. s. c.
5	...	19 3 8	6	...	1 2 0
7	...	6 34 8	8	...	1 7 0
9	...	22 24 8	10	...	13 6 8
11	...	17 13 12	12	...	13 17 0
Means	...	16 19 0	Means	...	7 8 0

The indications are that, on land which has received lime, the effect of green manure is inappreciable, the respective yields of manured and unmanured land being 16 maunds 20 seers and 16 maunds 19 seers of fibre per

acre. On the other hand, where no lime has been applied the effect of the green manure appears well marked, the respective yields being—

	Md.	s.	
Mean yield of unlimed green manured plots ...	10	34	per acre.
Mean yield of unlimed non-green manured plots	7	8	„ „
Difference	3	26	„ „

The apparently slight effect of the green manure on the limed land is in one way rather unexpected. The Dhaincha made much better growth on the land which had been limed than on that which had received neither lime nor bone and it was to be expected that the nitrogen and humous brought to the soil by the green manure would have their effect on the succeeding jute crop. At the same time it must be said that no marked results have yet been obtained at Dacca with green manure on other crops.

It is not quite satisfactory to have to compare one year's results with those of another because the effect of the season is always unknown, even if there are a sufficient number of plots to eliminate discrepancies in the land. It was hoped that further results regarding the effect of green manure on jute would be available in the present season; but adverse weather conditions have made it necessary to postpone the work till next year.

Demonstrations on cultivator's land with lime and bone as manures for jute.

Over forty cultivators living in the immediate neighbourhood of the Dacca Farm purchsed bone and lime for jute through Cooperative Banks in 1916. The season was very dry at the beginning, but the limed land gave good results. In the present season (1917) fewer applications have been made, but most of these consist of men who took lime last year or the year before. This is convincing evidence of the efficiency of the treatment we advise and the Co-operative Department has agreed to undertake an energetic campaign.

Effect of potash manure on jute in laterite soils in Eastern Bengal.

In last year's report a description was given of the experiments made in South Mirpur field, in 1915, with carbonates of soda and potash as manures for jute. The original idea was to ascertain how far these more soluble and more drastic alkalies could reinforce the effect of lime in the highly acid soil of the Dacca Farm. The whole area received about a ton (30 maunds) of lime, 3¾ cwts. (5 maunds) of flour phosphate and 40 lbs. nitrogen per acre. Out of 6 plots two received nothing in addition to the above; two received 380 lbs. carbonate of soda and two 500 lbs. carbonate of potash per acre.

The result was very surprising as the carbonate of potash plots gave a mean yield of 33 maunds 28 seers per acre, almost a record crop and better by nearly 6 maunds per acre than duplicate check plots, which themselves gave the very high yield of 27 maunds 35 seers per acre. The plots which received sodium carbonate were less than two maunds per acre better than the checks so that the effect of the carbonate of potash involved more than the mere neutralization of acidity.

The experiments with water hyacinth are described in last year's report and further details are given below which prove how valuable a manure potash is for jute on the red soils of Eastern Bengal. It is not necessary to discuss this matter further here; but it will be interesting to trace the history of the South Mirpur series last year (1916) and in the present year.

In 1916, it was decided to grow jute again on the plots in order to test the residual effect of the manures applied in 1915. Only a general manure (40 lbs. of nitrogen per acre as castor cake) was applied; the season was a very bad one and a long drought in May 1916 permanently stunted the growth of the crop. The results are given below and those for 1915 are included for purpose of comparison:—

	1915.		1916.	
	Md.	s.	Md.	s.
Check (mean of duplicates)	27	35	11	2½
Carbonate of soda (mean of duplicates)	29	31	11	10
Ditto potash (ditto)	33	28	11	17

The yields in 1916 were, to all intents and purposes, identical; but if the growth of the crop had been normal the figures would probably have shown a small margin in favour of the potash.

In the present year 1917, jute has again been grown, for the 3rd year in succession, on the above series, in connection with the investigation into the cause of Rhizoctonia, discussed below.

Rhizoctonia in jute the result of potash starvation.

Rhizoctonia is a soil fungus which, under certain conditions, attacks the roots of a number of plants, including jute, and produces wilt disease. Dr. Butler, Imperial Mycologist, classifies Rhizoctonia as being not virulent, but a common soil fungus, and this is supported by the fact that, through odd specimens of plants with Rhizoctonia may be found in jute fields in most districts, anything like a serious attack is only found in certain tracts, such as the red soils of the Dacca districts and, once, at the Rajshahi Farm.

At Rajshahi on one occasion Rhizoctonia became epidemic in a seed crop of C. Olitorious which had to be cut in order to save it from destruction. At Dacca the disease became more serious each year up to last year: it is especially liable to attack comparatively late sown jute, such as pure lines which, as a precaution against loss through weather uncertainties, are not usually sown until there is no danger of damage from drought. So serious did the danger to the selection work on jute seem to be becoming that its removal from Dacca was considered. In 1916, in order to save the crop, extravagant manuring with cowdung and nitrate of potash was resorted to: this action had the desired effect and as the same thing had happened once before it was concluded that the attack might be due to mal-nutrition in the plant. In 1916 also the Imperial Mycologist and the writer noticed that those plots which had received potash, or the equivalent in the form of water hyacinth were freer, on the whole, from Rhizoctonia than those to which potash had not been applied. The potash plots in South Hazi field were not entirely Rhizoctonia free, but there were, on the whole, considerably fewer affected plants in them than in other plots.

In order to throw further light on this important question it was ultimately decided to sow jute again in 1917, for the third year in succession, in the potash series of plots in South Mirpur field. There was a two-fold object in using this series. Firstly, it had been noticed that the oftener jute is sown in any given land the more liable the crop is to be seriously attacked with Rhizoctonia. An almost universal practice, which is the result of experience, exists among cultivators in the red soil tract, *i.e.*, not to sow the same land with jute oftener than twice in five years or, better still, once in three years. The series in question had already carried jute for two years and, 1917 being the third season, it was therefore highly probable that Rhizoctonia would appear with some severity, unless prevented from doing so. Secondly, it was thought that the potash treated plots would, if Rhizoctonia is associated with potash shortage, show a comparatively greater resistance to the incidence of the disease than the plots not treated with potash.

Before sowing the whole of the series received the following manurial treatment:—

Castor cake	...	... 40 lbs. nitrogen per acre.
Bone meal	...	... 55 „ phosphoric acid, P_2O_5 per acre.

In addition the two potash plots received the ash of water hyacinth in quantity containing 200 lbs. potash K_2O per acre. This is equivalent to a dressing of 370 lbs. (4½ mds. or 3¼ cwts.) of pure sulphate of potash per acre. The soda plots received 220 lbs. per acre of carbonate of soda, equivalent to 130 lbs. Na_2O per acre.

Sowing could not be done till the middle of May, which is late, and the season has so far been unfavourable. All the plots have therefore suffered to some extent; but at the time of writing the crop on the potash plots is probably nearly 50 per cent. better than that on the others. Moreover Rhizoctonia is, even now, rampant in the latter which contain about ten times as many diseased plants as the potash plots. The following is the

result of a count of diseased plants in a band nine feet wide across the whole series of plots :—

Plot number.	Special treatment of plot.	Number of diseased plants in portion of plot examined.	Approximate number per acre.
(*a*)	Carbonate of soda	109	17,585
(*b*)	Check	97	15,649
(*c*)	Hyacinth ash (200 lbs. K_2O per acre)	12	1,933
(*d*)	Carbonate of soda	63	10,141
(*e*)	Check	55	8,873
(*f*)	Hyacinth ash (200 lbs. K_2O acre)	6	968

These figures are fairly conclusive, but the final result promises to be even more definite for it is reasonably certain that while the potash plots will give a fair crop of fibre the bulk of the plants in the other plots will die before they are fit to cut.

It is interesting to note that the plots treated with soda carbonate are distinctly the worst all through. The effect of the soda originally applied would be to set free a certain amount of potash, which was used up by the crops of 1915 and 1916. In this case the soda plots will be worse off in regard to potash than the other plots and the larger number of deceased plants in the former is thus capable of easy explanation.

It is perhaps worth remarking that at least one other fungus disease of plants has been proved to be due to mal-nutrition, viz.:—the "finger and toe" disease of turnips in Europe, which is due to lack of lime.

Water Hyacinth.

In dealing with this subject in last year's report, it was mentioned that an extensive series of field experiments had been commenced, in collaboration with the Deputy Director of Agriculture, Eastern Bengal, to investigate the agricultural value of water hyacinth (Eichornia Crassipes). The results of the tests are now available and they have been published as a Departmental Bulletin from Pusa.

In the field trials Hyacinth was used both in the rotted state, without burning and after burning, as ash. The quantities were such that the amounts of potash applied to the respective plots were approximately equivalent (90 lbs. K_2O per acre). The rotted Hyacinth supplied its own nitrogen, but the plots receiving ash, which contains no nitrogen, were treated, in addition, with an amount of castor cake equivalent to 40 lbs. of nitrogen per acre. Check plots were also manured with cake as above; but did not receive hyacinth either in the rotted form, or as ash.

The average yield of the plots receiving Hyacinth in either form was better than the return from the check plots by about 5½ maunds of fibre per acre. That this considerable increase was due to the action of the potash was proved by applying equivalent quantities of pure potash salts (carbonate, sulphate and chloride, respectively) to another series of plots, which also gave similarly increased yields over the checks. It is thus demonstrated that water Hyacinth, either rotted or in the form of ash, is a valuable manure for jute, and that if so used the cost of taking it out of the water is likely to be at least covered by the extra return of fibre due to its application as a manure.

On the other hand those who have no use for Hyacinth as a manure can sell the ash at a price depending on its content of potash. Messrs. Shaw Wallace & Co. of Calcutta have offered to buy any quantity of the ash on a basis of Rs. 4 per full unit of potash *F. O. R.* Calcutta.

Through the influence of Mr. Hart, Collector of Dacca, and the Director of Agriculture about 150 *Panchayets* in the Dacca district were enabled to inspect the field tests at the Dacca Farm referred to above; also, on the occasion of other meetings of *Panchayets*, the opportunity was taken to explain the results of the experiments to those present. Further, in consultation with Mr. Hart, leaflets in English and Bengali have been drawn up containing information regarding the uses to which the water Hyacinth can be put. About 8,000 copies of the first leaflet in Bengali and 1,000 copies in English were distributed in the Dacca district by Mr. Hart in January 1917 and smaller numbers have been sent to Tipperah and other districts.

These efforts have met with gratifying success and an excellent start has been made in the production of the ash for sale. During the last six months Messrs. Shaw Wallace have purchased about 250 tons* (roughly 7,000 maunds) of the ash and the Government Farm, Dacca, has also purchased about 500 maunds 20 tons. Taking the ash content of the green plant at something like 1 per cent. the 7,500 maunds of ash represent the destruction of about 27,000 tons (seven and a half lacs of maunds) of green plant.

It is hardly necessary to point out that these quantities are only a very small fraction of the enormous total which has to be dealt with, not only in Bengal, but in other parts of India, and of the world; but a sufficiently good start has now been made to show that the proposals made are feasible. The amount of ash produced this year corresponds to about 30 tons of chloride of potash and, if progress continues, water Hyacinth may, in the future, become an important source of this valuable plant food.

Recent investigation has shown that the composition of the ash varies considerably with the conditions under which the plant grows. In the water courses in Dacca City, for instance, the growth of the plant is very luxuriant, reaching as great an above water height as 3 feet. Such big plant has been found to contain the richest ash. On the other hand the plant growing on land, in tanks, or in shallow water, especially in the red soil districts, is usually stunted. It often contains a large percentage of ash, but the greater portion of this proves to be silica and the potash content is comparatively low. Analysis of the ash of tall plant from the Dacca Khal and of plant from a tank at Mirpur on the red soil are appended :—

	Plant from Dacca Khol.	Plant from Mirpur (red soil).
	Per cent.	Per cent.
Ash in dried plant	30·6	29·8
Containing Si. O_2	20·72	49·43
K_2O	34·15	11·36
P_2O_5	8·20	1·41
Ca O	8·43	7·79
Cl	29·37	5·66

The ash of No. I would be worth Rs. 5 per maund (80 lbs.) F. O. R. Calcutta on the basis of Rs. 4 per unit of potash. Moreover, its content of phosphoric acid adds roughly Re. 1 per maund (80 lbs.) to its value, making a total approximating to Rs. 6 per maund.

No. II has only one-third the potash content of No. I and is the poorest sample of clean plant ash yet examined. It is worth about Re. 1-11 per maund.

It has been found that a considerable proportion of the potash in the dead hyacinth plant can be extracted with cold water. Therefore, the preparation, either of ash or of rotted material, is to be avoided in Bengal during the rainy season. From the middle of October till the end of March would appear to be the most suitable time for these operations.

Of the samples of ash prepared for sale a number have proved to be unexpectedly poor in potash. This may have been due to several causes. In practically every case an undue proportion of earth was found; also a number of samples, but not all, were wet. The earth may have represented either adulteration, or mere carelessness in collecting the ash. In any case, as the sample is valued by chemical analysis, the extra weight is not only of no benefit to the vendor; but actually costs him more in freightage.

The addition of water, whether deliberate or through allowing the ash to be washed by rain, is especially unwise, not only because the extra weight is of no benefit to the vendor; but because the bulk of the potash is present as chloride of potash, which is as soluble as salt or sugar, and therefore liable to be dissolved out and lost by the addition of even a comparatively small quantity of water. 10,000 copies of a second Bengali leaflet containing this and other information on the subject of water Hyacinth have recently been distributed in the affected districts.

The field tests commenced last year are being continued this year as a demonstration and in spite of an exceptionally unfavourable season they promise to be quite as convincing as last year. Arrangements are being made by Mr. Hart for a much larger number of *panchayets* (about 800 in all), than those who came at his invitation last year, to see the plots. It is gratifying to know that Mr. Hart's action this year is in response to requests made by the *panchayets* themselves.

* Since the above was written the quantity of ash produced has risen to 20,000 maunds or nearly 750 tons representing the destruction of about 75,000 tons of green plant. R. S. F.

Selection and distribution of improved jute seed.

(*a*) *Corchorus Capsularis.*—Last year 1916, roughly 300 maunds (24,000 lbs.) of the seed of the pure line jute Kakya Bombai No 7, were produced. The seed is now well known and the demand for the present season's crop was so great that at least twice as much seed as was available could have been sold at full market rates. This season arrangements have been made for the production of between 1,500 and 2,000 maunds (about 90 tons) of the seed of Kakya Bombai No. 7, for next season's crop.

The Director of Agriculture and the District staff have organized an elaborate scheme for the dissemination, through the *panchayets*, of this seed on a very large scale. The scheme is described in detail elsewhere, but it will interest readers of this report to know that it involved the distribution at the commencement of the present season of over 30,000 packets of seed and that, if successful, over 30,000 acres of improved jute will be grown in the Dacca and Mymensingh districts in 1918. It should be possible in this way to affect the bulk of the area growing *Capsularis* jute in the course of very few years. The jute agency tests (see below) in 1916 resulted on an average increased yield of over three maunds of fibre per acre in favour of the Dacca seed. In the *Capsularis* growing tract alone this would mean an increased output of about twelve lacs of bales worth at Rs. 40 per bale, nearly five crores of rupees, or about £3,000,000 sterling per annum. Such figures show what tremendous results the work of the Agricultural Department is capable of yielding, and at what small cost such improvements are being attained. A sum like £3,000,000 would support the whole Indian agricultural service for years and in doing so, would enrich the people of India by something like thirty times its value.

Corchorus Olitorius.—The multiplication of several pure lines of *C. Olitorius* has been proceeding during the last 3 years. This season about 20 acres have been sown with the seed of these pure lines and as a result sufficient seed will be available next season not only for further multiplication, but also for distribution on a small scale. Tests are being carried out at the Rajshahi and Chinsurah Farms and also at Baraset, where the work is in charge of the Superintendent of Agriculture, Presidency Division. It will probably be possible next year to commence the same policy of distributing *C. Olitorius* seed in Western Bengal as is already proceeding in Dacca and Mymensingh with *C. Capsularis:* it will not take long to affect the comparatively small area in which *C. Olitorius* is produced.

Co-operation of Calcutta Firms in district field work.

In last season's report a description was given of the arrangement which had been made with Messrs. Sinclair Murray & Co., and Messrs. Landale and Clark, Ltd., of Calcutta, whereby these firms undertook to provide land, labour and supervision for the purpose of testing the Dacca selected jute seed against local jute at their various agencies. Messrs. Bird & Co., through, Mr. Ducat, also placed a large plot of land at Narayanganj at our disposal and the Fort Gloucester Mill (Messrs. Kettlewell Bullen & Co.) through Colonel Tyrie, V.D., did likewise at Boureah. In all there were 23 plots at 18 different places throughout Bengal. Of these Messrs. Landale and Clark, Ltd., gave 7, and Messrs. Sinclair Murray & Co., 14.

Results of tests made for comparing the outturns of Kakya Bombai No. 7 and local jute at the jute agencies in 1916.

Serial number.	Place.	Name of Agency.	Local Manager.	Area in acres.	Outturn of fibre of Kakya Bombai per acre.	Area in acres.	Outturn of fibre of local jute per acre.	Difference in favour of Kakya Bombai per acre.	REMARKS.
					Mds. sr. ch.		Mds. sr. ch.	Mds. sr. ch.	
1	Chounuhani ...	Messrs. The Chittagong Company, Limited. (Messrs. Sinclair Murray & Co.)	Mr. R. E. Barlett	·375	27 10 0	·243	25 0 0	+2 10 0	K. B. average of 3 plots. Local ditto 2 ,,
2	Akhaura ...	Ditto ditto ...	Mr. P. A. Sharpe	·465	16 22 8	·334	14 9 8	+2 13 0	K. B. average of 7 plots. Local ditto 5 ,,
3	Narainganj ...	The Narainganj Company, Limited. (Messrs. Sinclair Murray & Co.)	Mr. J. Luke ...	...	29 0 0	...	25 20 0	+3 20 0	K. B. average of 3 plots. Local ditto 4 ,,

Serial number.	Place.	Name of Agency.	Local Manager.	Area in acres.	Outturn of fibre of Kakya Bombai per acre.	Area in acres.	Outturn of fibre of local jute per acre.	Difference in favour of Kakya Bombai per acre.	REMARKS.
					Mds. sr. ch.		Mds. sr. ch.	Mds. sr. ch.	
4	Narainganj ...	Messrs. Bird & Co. ...	Mr. D. Ducat ...	·133	10 20 0	·133	9 0 0	+1 20 0	
5	Ashuganj ...	The Chittagong Company, Limited. (Messrs. Sinclair Murray & Co.)	Mr. M. Avdall ...	·771	22 6 0	·756	18 16 0	+3 30 0	K. B. average of 2 plots. Local ditto 2 ,,
6	Chatalpara ...	Messrs. Landale and Clark, Ltd.	Mr. H. Sanbolle	·458	18 37 7	·458	12 33 14	+6 13 9	Each average of 3 plots.
7	Chandpur ...	The Chittagong Company, Limited. (Messrs. Sinclair Murray & Co.)	Mr. A. Manuk ...	·167	13 35 0	·167	12 10 0	+1 25 0	Ditto 2 ,,
8	Ditto ...	Ditto ditto ...	Ditto ...	·23	18 10 0	·191	21 25 3	−3 14 11	Ditto 2 ,, The plots were damaged by cattle and the results were described as not reliable.
9	Mymensingh ...	Ditto ditto ...	Mr. J. Vardan ...	·62	21 0 5	·62	16 30 15	+4 9 6	Each average of 4 plots.
10	Ditto ...	Ditto ditto ...	Ditto ...	·34	26 26 2	·34	20 11 12	+6 14 6	Ditto 6 ,,
11	Sarisabari ...	The Chittagong Company, Limited. (Messrs. Sinclair Murray & Co.)	Mr. A. M. Simmons	92	13 32 5	·32	13 15 15	+0 16 6	Ditto 2 ,,
12	Ditto ...	Ditto ditto ...	Ditto ...	·22	14 37 12	·22	14 28 0	+0 9 12	Ditto 2 ,,
13	Ditto ...	Ditto ditto ...	Ditto ...	·20	14 35 0	·20	14 27 8	+0 7 8	Ditto 2 ,,
14	Ditto ...	Messrs. Landale and Clark, Limited.	Mr. A. Cameron	·36	16 17 12	·26	14 38 0	+1 19 12	
15	Niklidampara ...	The Chittagong Company, Limited. (Messrs. Sinclair Murray & Co.)	Mr. A. S. Gregory	·16	11 19 6	·16	8 28 2	+2 31 4	Each average of 2 plots.
16	Ditto ...	Ditto ditto ...	Ditto ...	·21	13 25 4	·21	13 1 7	+0 23 13	Ditto 2 ,,
17	Sherajganj ...	Ditto ditto ...	Mr. J. M. Shircore	·295	25 10 2	·295	15 29 12	+9 21 6	Ditto 2 ,,
18	Ditto ...	Ditto ditto ...	Ditto ...	·219	21 30 0	·219	16 10 14	+5 20 13	Ditto 2 ,,
19	Saidpur ...	(Messrs. Sinclair Murray & Co.)	Mr. E. A. S. Thomas.	...	24 26 9	...	20 21 15	+4 4 10	
20	Jalpaiguri ...	Ditto ditto ...	Ditto ...	...	18 30 3	...	11 22 0	+7 8 3	
21	Durwani ...	Ditto ditto ...	Ditto ...	...	19 19 0	...	15 1 6	+4 17 0	Each average of 4 plots.
22	Haldibari ...	Messrs. Landale and Clark, Limited.	Mr. P P. Paul ...	·166	14 10 0	·166	11 10 0	+3 0 0	Ditto 2 ,,
23	Matehar (Rajshahi)	Ditto ditto ...	Mr. K. D. Tibbetts	·13	16 2 5	·13	11 2 5	+5 0 0	This was a comparison between Rajshahi Farm and local *corchorus olitorius*. The plots were damaged by cattle and the results were unreliable. Each average of 2 plots.
24	Boureah ...	Fort Glouster Mill (Messrs. Kettlewell Bullen & Co.)	Col. Tyrie ...	...	17 28 0	...	18 0 0	0 12 0	In this case Kakya Bombai was tried by mistake against local olitorius. The instructions were that Rajshahi olitorius should be sown instead of Kakya Bombai.

A perusal of the above table shows that only two plots, viz., one at Chandpur and the one at Boureah gave negative results. Of these the Chandpur land was on the edge of a right of way and it was unfortunately found impossible to prevent cattle from straying into the crop. Both Dacca seed and local seed plots were damaged to an uncertain extent, but as the Kakya plot was decidedly the taller, shortly before at the time of cutting, it is to be presumed that it was more damaged than the local seed crop. Seeing that Boureah is in the deshi jute area, it was intended to compare local *olitorius* with seed from Rajshahi, but, by mistake, Kakya Bombai was sown instead of the Rajshahi seed. The lateness of the sowing season is the chief reason why *C. Olitorius* is grown in Western Bengal; it thrives better under these conditions than *C. Capsularis*, which requires to be sown earlier as a rule.

Taking the whole of the tests in which Kakya Bombai was used the average difference in favour of the latter over the local seed was just over 3 maunds of fibre per acre. The margin would probably have been greater if the approach of floods had not made it necessary to cut some of the plots before they were ripe; this was notably the case at Messrs. Bird & Co.'s plot at Narainganj and at that of the Chittagong Company, Limited, at Niklidampara.

The results have been of very great value to the Department as it was known that everything possible had been done to make the yields from the respective plots comparable. The Department hitherto had no reliable results from the districts which justified a definite policy of jute seed distribution on a large scale; but the tests in question supplied the necessary information. It is interesting to note that the site of each test has become a centre for the sale of seed to cultivators in its neighbourhood and there is no doubt that the tests have done a great deal, not only to advertise this particular jute seed, but in making the Agricultural Department generally better known. They have indeed thoroughly fulfilled expectations and the firms under whose auspices they have been carried out are to be congratulated on their public spirit. Messrs. Suttie, Gall, Blount and Kinmond Luke have all taken an enthusiastic interest in the work and their interest has not flagged now that the second season of activity has commenced. We are also greatly indebted to the various mufassil agency managers, upon whom a considerable amount of work has fallen. Messrs. Mactavish, Luke and Ducat of Narainganj, Mr. Manuk of Chandpur, Mr. Shircore of Serajgunj, Mr. Thomas of Saidpur and Mr. Paull of Haldibari have all not only taken a great interest in the plots, but have exerted themselves in satisfying, as far as possible, the demand for Dacca seed which the tests have created.

The work is being continued in the present year on the same lines as before; later on, as the soil survey increases our knowledge of the manurial requirements of the various districts, it is hoped that it will be possible to utilize the agencies in this direction. A tentative commencement in this direction has been made in the present season on land at Narainganj, kindly placed at our disposal by Messrs. M. David & Son.

Publications.—During the year under review the following reports have been published by the Imperial Department of Agriculture, Pusa:—

(*a*) "Water Hyacinth; its value as a fertilizer" by R. S. Finlow and K. McLean.

A short note on this subject was also read at the Bangalore meeting of the Indian Science Congress.

(*b*) "Heart damage in baled jute" by R. S. Finlow.

I have pleasure in acknowledging the excellent work done during the year by my Assistant, Mr. N. C. Basu, M.Sc.

ROBERT S. FINLOW, B.Sc., F.I.C., F.C.S.,

Fibre Expert, Government of Bengal.

DACCA,

The 3rd August 1917.

OFFICE OF THE AGRICULTURAL CHEMIST TO THE GOVERNMENT OF BENGAL.

A brief report of the work done by the Agricultural Chemist to the Government of Bengal, Dacca, for the year ending 30th June, 1917.

Charge.

In September 1916, Mr. Annett was deputed to the United Provinces to assist Mr. Leake in his work on opium; I took over from Mr. Annett on September 28th, 1916, and have remained in charge of the work of the Agricultural Chemist during the remainder of the year under review.

Tours.

Mr. Annett was on tour 27 days before his departure, visiting Calcutta twice and Pusa once.

The Senior Assistant, Mr. Pal, has spent 51 days on tour, chiefly in connection with soil survey work in West Bengal and the Second Assistant, Babu Indubhusan Chatterjee, spent 12 days on similar work in the Dacca district.

Soil Survey of Bengal.

It has been decided to concentrate almost the entire energy of the section on this important work, upon the completion of which must largely depend any comprehensive application of the results of manurial experiments.

The soils of the Presidency can be classified into two broad divisions: (*a*) the old alluvium, (*b*) the new alluvium.

The former apparently constitute a considerable part of West and South-West Bengal and it also embraces the Madhupur jungle tract in Mymensingh and Dacca, as well as a large tract of country in Tippera, and southward through Noakhali towards Chittagong. These soils are generally fairly heavy in texture, red in colour and acid in reaction. Often, below the first six inches, they show nodular structure, the nodules being composed of oxide of iron precipitated round a core of soil. They contain little organic matter and their moisture holding capacity is low. They often contain no free carbonate of lime and they are generally markedly poor in phosphoric acid. Commonly also, as at Dacca in the Madhupur jungle tract, they answer very readily to applications of potash where crops like jute are grown.

The soils of the new alluvium, while differing widely from the above in general characteristics, nevertheless show considerable differences amongst themselves. In the inundated tracts in South-East Bengal they vary from fairly coarse sand, in the *churs* and on the banks of the rivers where the coarsest silt deposits first, to soils of very close texture in the low-lying bheel tracts, which receive only fine suspended matter. Soils of both types are normally very rich, especially in potash, of which many contain as much as 1·5 per cent. of K_2O. They receive an annual inundation from the rivers and a deposit of silt is often the result. It is on such land in the districts of Pabna, Dacca, Faridpur and Tippera that fine crops of jute are grown year after year with little or no application of manure. On the red soils described above, continuous, or even frequent, cultivation of jute, without application of potash manures, would result in annihilation of the crops by the root fungus *rhizoctonia*.

A different type of new alluvial soils is found in Mymensingh, Rajshahi and in Northern Bengal. These soils are not inundated by the rivers, and they also differ considerably amongst themselves. In Rajshahi soils appreciable amounts of carbonate of lime are often found and this tract appears to be the eastern limit of the highly calcareous Behar alluvium. In Northern Bengal and in Mymensingh free carbonate of lime is rare. Some Rajshahi soils are, according to Leather's analyses, particularly deficient in potash and *rhizoctonia* in a virulent form has been found in jute there.

The red soils (old alluvium) are being investigated first as they seem to show more pronounced deficiencies than the new alluvium. During the dry season of 1916-17, a large number of samples were collected both in East and in West Bengal and these will be sufficient to occupy the attention of the available staff during the monsoon period.

Sugar.

This work is limited at present to examination of a number of Bengal varieties collected by the District Staff in regard to the sucrose content of their respective juices. Last season (1916) was not a favourable one and only one or two of the Indian varieties did well. Of them Sarethi, imported from the United Provinces and Puri, a thick red cane sent from Berhampur, were the best. The work is being continued in the present season.

Routine work.

Routine analyses were carried out as required.

Mr. G. B. Pal, M.SC., Senior Assistant, and Babu Indubhusan Chatterjee, Second Assistant, have done good work during the year under review.

ROBERT S. FINLOW, B.SC., F.I.C.,

Offg. Agricultural Chemist, Bengal, Dacca.

DACCA,

The 20th August, 1917.

ANNUAL REPORT OF THE ECONOMIC BOTANIST, BENGAL, FOR THE YEAR ENDING 30TH JUNE 1917.

A.—Charge.

THE Economic Botanist was on leave during the whole of the year under review and I have held charge of the section. There have been no changes in the staff, but two temporary assistants have been employed in connection with the work on rice.

B.—Tours.

The Assistant Economic Botanist was on tour for 21 days during which he visited the following places:—Faridpur Exhibition and twice to Chinsurah for paddy investigations. The Fieldmen belonging to the section were on tour for 55 days, attending the Faridpur and Rangpur Exhibitions; collecting samples of seeds in Pabna, Dinajpur, Bogra, and for paddy work at Chinsurah. A further visit to Bikrampur was made to procure seeds of deep water *Aman* paddy for Ufra experiments.

C.—Work.

The object during the year has been to keep the work of the section in progress on the lines laid down by Mr. Hector. No attempt has been made to initiate new investigations.

Study and testing of varieties with the object of improving the yield of the rice crop.—(1) This work has been continued on the collection of 2,000 new races introduced from the districts in 1915. The process of elimination of poor yielding races has been carried out on the same lines as before, with the result that about 79 high yielding pure lines still remain. These are being tested in the present year against Indrasail as a standard and though most will probably not come up to the latter in yielding capacity, there are one or two which give great promise.

In the meantime the variety Indrasail has been widely tested in the districts and has given excellent results, averaging about 6 maunds of grain per acre better than local races tried against it. Over extensive areas in

Dacca and Mymensingh, hundreds of cultivators now recognize the superiority of Indrasail, and the demand for the seed is considerably greater than the supply. In the last year, 1,200 maunds (44 tons) of pure seed were raised on the Dacca Farm and 800 maunds (30 tons) was grown by, and purchased from, cultivators in the districts of Dacca and Mymensingh. This seed is being distributed in small quantities through the Panchayets in accordance with a scheme organized by the Director of Agriculture. There are already indications that the scheme will be successful and in this event the area under Indrasail will rapidly attain to very great dimensions. In order to realize the potentialities of this work it is only necessary to think of the enormously increased annual revenue which would accrue to the Bengal cultivator by the universal cultivation of Indrasail on the transplanted *Aman* paddy lands of Bengal. The official returns only give the combined areas of broadcasted *Aman* (bheel paddy) and transplanted rice, so it is difficult to estimate the area of the latter. There is little doubt, however, that there are at least 10,000,000 acres of transplanted rice in Bengal, of which more than half has been proved suitable for Indrasail. Assuming an increased yield of 5 maunds (410 lbs.) per acre to result from growing Indrasail there would be an aggregate increase of 30,000,000 maunds (1,100,000 tons) of grain per annum in the districts where it is cultivated. This would be worth about £5,000,000 sterling or Rs. 7,50,00,000 (seven and a half crores), *i.e.*, about Rs. 4 per head per annum for every man, woman and child in the tract in question.

The above refers at present mainly to Eastern and Northern Bengal, including the Rajshahi, Dacca and Chittagong Divisions. It is not yet certain that the results of the work at Dacca will apply generally in the different climatic conditions existing in South-West Bengal, including the Burdwan and Presidency Divisions. An attempt is being made to settle the point by work at Chinsurah, but it has not been found feasible to give it such supervision as would ensure reliable results; nor is there any prospect in the immediate future that it will be possible to spare sufficient time for this purpose from the work at Dacca.

Aus Paddy.—As a result of the present season's work the multiplication of the pure line variety *Katak Tara* will have reached sufficient dimensions to allow of its distribution. About 200 maunds (7½ tons) of seed will be available and it is proposed to make a start in West Bengal next season.

Ufra disease of rice.—Experiments on an extended scale have been started in collaboration with the Collectors of Dacca, Tippera, the Deputy Director of Agriculture, Eastern Circle, and the Imperial Mycologist to test the effect of the remedial measures already proposed, viz.:—

(*a*) Burning of stubbles.
(*b*) Thorough cultivation after burning.
(*c*) Sowing of disease free seed.

The disease failed to appear in any of the plots in the country near by excepting at Pubail, where the whole crop was damaged. It was, however, doubtful whether it had been possible to thoroughly burn the stubble or to do good cultivation at Pubail and the experiment is therefore being continued in the present season. Thorough burning of the stubble was carried out in the dry season on selected areas in Dacca and Faridpur. These areas are now under observation to determine the effect of the treatment. Further details will be found in the report of the Mycological Collector.

At the instance of the Imperial Mycologist a comprehensive survey is being made to ascertain the extent of the tract of country in which Ufra is doing serious damage to the deep water rice crop of the Province. The survey was commenced in Faridpur and Bakarganj in September 1916 and was carried on until the crop had been reaped. Babu Kali Prosanna Rai was employed as temporary assistant for this work. It was found that large tracts in both districts are heavily affected.

Fruits.—The fruit area is now beginning to reach an interesting stage and there are some indications that one or two of the mango trees (variety Krisapati) are more resistant to mango fly than others. If this ultimately proves to be the case the result may have an important bearing on mango culture in East Bengal, where the fly is so universal a pest as to render the production of good fruit in many years an impossibility.

Entomology and Mycology.—The Entomological and Mycological Collectors continued to work under the Economic Botanist. Separate reports are submitted of their work.

An attempt is being made to test the practical value of suggested remedies for insect pests, etc., and also to accumulate such information regarding plant pests in general as may ultimately be useful in diminishing the damage they regularly do to crops in this Province.

ROBERT S. FINLOW,
Acting Economic Botanist, Bengal.

DACCA;
The 3rd August 1917.

No. 374, dated Pusa, the 11th July 1917.

From—T. BAINBRIGGE FLETCHER, ESQR., F.L.S., F.E.S., F.Z.S., Imperial Entomologist, Pusa, Bihar.

To—The Director of Agriculture, Bengal.

WITH reference to your letter No. 4713-14, dated the 7th June 1917, I have the honour to inform you that there was received only one enquiry from your Presidency during the year ending 30th June 1917, and this was from Mr. W. P. Pulger, Post Office Marybong, district Darjeeling, who reported damage to his potato crop by the "Small Red Ant" (*Dorylus orientalis*) and wished to know some remedial measures against the pest. Mr. Pulger was requested to send in specimens of the insects which were damaging his crop for exact identification before any methods for their eradication could be recommended. On receipt of specimen it was found that there were four distinct insects which were responsible for the damage, but chief of these were *Agrotis ypsilon* and *Dorylus orientalis*. To control these pests some practical measures were suggested.

In addition to the above all the necessary assistance was given from here as usual to the Provincial Department of Agriculture in the way of identifying their insect pests, preparing and supplying coloured plates and magic lantern slides of injurious insects.

T. B. FLETCHER,
Imperial Entomologist.

REPORT ON WORK DONE FOR THE PROVINCE OF BENGAL BY THE MYCOLOGICAL SECTION, PUSA, DURING THE YEAR ENDING 30TH JUNE 1917.

Ufra disease of rice.—During the past year this disease has been traced across the Meghna into the districts of Bakarganj and Faridpur, extending westwards in this area as far as the river Madhumati. The area now known to be infected is, from east to west, from the Mahari river, near the Chittagong border of Noakhali, to the Bakarganj-Khulna boundary, and from south to north, from near Noakhali town to the Dacca-Mymensingh boundary. Extension into Mymensingh, Khulna and Sylhet is probably going on. The Collector of Dacca reported that part of the winter rice crop was so severely damaged on the eastern side of the Madhupur jungle and near the Lakhya river that it was not worth harvesting.

Experiments carried on at Pusa have thrown light on several of the anomalies in the parasitism of the eelworm which causes ufra. It was previously known that the spring crop, called *boro* rice, and also the transplanted autumn and winter rice, ordinarily escape the disease under natural conditions, though they can be readily inoculated artificially. As the *boro* fields are often surrounded by severely infected fields of winter (*aman*) rice, they are certainly frequently contaminated by diseased stubble from the latter, and it was not easy to understand why they were not attacked. It has now been conclusively proved that the worm cannot migrate so as to reach the upper parts of the rice plant, where alone it can feed, in dry air, but does so readily when the humidity of the air approaches saturation point, even though there is no film of free water on the plants. It has also been found that worms preserved dry retain their vitality and are able to renew active motion after at least eight months, while those kept in moist air

remain alive for about four months, and those immersed in water for only one to two months. The *boro* fields are submerged in water from the time the crop is transplanted into them in December-January until near harvest. Worms set free into this water from previously infected stubble, will die unless they can migrate from the water within a couple of months. While the seedlings are small, no doubt some can migrate to them at or near the water level but the injury caused to rice plants at this stage of growth is slight. As the plants get bigger only certain parts near the top of the shoot (above the upper joints of the stem and the young ear chiefly) remain susceptible to attack, as only these parts have unthickened cell walls. But the worm is unable to reach them owing to the low air humidity between February and April, and so the plants escape the serious damage that results from an attack on the shoot, while the ears are developing. The crop is harvested in April before the humidity rises enough to allow any worms that may still remain alive on the lower parts of the plants to migrate to the top of the shoot. It has also been found that the worm does not reproduce if immersed in water or if kept dry, but only in moist air. There is, therefore, no multiplication of the parasite in the flooded fields nor amongst any that may get carried up on the growing *boro* plants. If the plants are covered with bell-jars, so that the air around them is kept nearly saturated, infection can readily be obtained from artificial inoculations at any time of the year. If not covered, successful infections can only be got during the rains and early cold weather, while the natural humidity is high.

The escape of the transplanted paddy is due to the fact that it is grown on relatively high ground. The crop is harvested so that not much stubble is left, and the fields are ploughed early. It has been proved that worms set free into the soil do not remain alive long, and the new crop is not transplanted out until much after the period that has proved sufficient to free the soil from infection. If worms could reach the transplanted fields from neighbouring infected broadcasted fields, they would doubtless attack the transplanted paddy; but as a rule the flood water does not rise sufficiently to establish direct connection until relatively late in the season, and often not at all. That infection in this way does, however, sometimes occur is probable from the occasional reports that have been received of injury to the transplanted winter crop.

In certain parts of the infected area the rice *bils* are narrow and deeply concave. In the bottom of these the soil remains muddy into February and where deep-water *aman* has been grown, a second growth of small shoots and ears arising from the long matted stubble can be found up to mid-February. In infected *bils* this second growth harbours large numbers of actively feeding and multiplying worms. The ground does not dry out sufficiently to permit of ploughing until February in many cases, and the new crop has to be broadcasted very soon—in March—as the *bil* bottoms flood early. Hence the worms have only about a month to live through before the new crop is sown and free water collects, and about another two months before the humidity rises (in May) enough to permit of migration. Reports are common that the earliest attacks of ufra are seen in these low-lying patches which is just what would be expected. It is not suggested that ufra always, or even frequently, arises from these low-lying patches, as it has been conclusively proved that the stubble in the paddy flats that dry out in December, as the great bulk of them do, is equally able to carry over infection to the next crop. But whereas it is relatively easy to remove the infected stubble and plough early in the latter, this cannot readily be done in the former. So long as the soil remains muddy it is practically impossible to allow the work cattle into it, and even if the stubble could be collected it is too wet to burn properly in December. When the stubble can be removed and the land ploughed it is so near sowing time that the chances of killing out the worm before the new crop appears, are scanty. There appear to be only two ways of dealing with these muddy patches: to drain them so that they dry in time to permit of effective stubble destruction, or to deepen them so that they can grow *boro* paddy. The latter is only possible in the vicinity of permanent waterways or khals as the *boro* crop has to be irrigated during its growth, but as these khals replace roads throughout much of the area there is a general demand for new ones wherever practicable. Experiments have been started to ascertain the best way of dealing with this problem.

An attempt to induce the paddy cultivators to burn the stubble and plough early was made. Leaflets were distributed throughout the infected area and several demonstrations were arranged for, partly by the Department of Agriculture and partly by the Revenue officials. In the Sadar

Subdivision of Tippera 12 previously diseased plots were treated, all of which escaped *ufra;* in Chandpur 64, of which 9 got slight attacks. There was less *ufra*, however, in this district than for several years. In Dacca the land selected was very swampy and the treatment was ineffective, probably for the reasons given in the last paragraph.

Rhizoctonia on jute.—There was a good deal of damage to the crop on Dacca farm from this disease last year. The Imperial Mycologist observed in August that certain plots that had been very heavily manured were practically immune. Experiments have been arranged with the Fibre Expert to ascertain which (if any single one) of the manurial constituents supplied was responsible for this result. From the preliminary results obtained, Mr. Finlow is inclined to believe that the attacks of Rhizoctonia on jute at Dacca may be largely attributed to a deficiency of potash.

Root rot of the sal tree.—This investigation was carried on throughout the year. The results of inoculations carried out at Rajabhatkhawa were not decisive and it is hoped to obtain more definite information from the statistics which are being accumulated by the local Forest officers and from the results of inoculations made at Dehra Dun in collaboration with the Forest Botanist.

Reports were issued on specimens of diseased crops and of fungi sent in by the officers of the Department. Among these the fungus which is associated with heart rot of jute was identified as *Aspergillus fumigatus* and a disease of mangoes proved to be due to the attack of *Gloeosporium.* The latter is a wellknown disease in Florida and may cause trouble in Bengal.

F. J. F. SHAW,
Imperial Mycologist.

ENTOMOLOGICAL REPORT FOR THE YEAR ENDING 30TH JUNE 1917.

DURING the year I spent 101 days on tour and visited the following places :—

July.—To Bashirhat to investigate Rice Hispa (*Hispa aenescens*) and demonstrate bagging.

August.—To Barisal for the above purpose.

September.—To Kurmitola to examine "Ufra" experimental plot.

To Jessore to investigate Rice Hispa and suggest remedial measures.

To Kurmitola to investigate Rice Bug.

To Baraba to investigate "Ufra or Dak" disease of paddy and suggest preventive measures.

October.—To Kurmitola to examine "Ufra" experimental plots.

To Haldibari to investigate a betelnut disease with the Mycological Collector.

To Feni to investigate Rice Swarming Caterpillar (*Spodoptera mauritia*) and demonstrate remedial measures.

November.—To Rangpur to attend the Agricultural Exhibitions.

To Kurmitola to examine "Ufra" experimental plots.

To Nagari with the Mycological Collector to select affected paddy plots for "Ufra" experiment.

December.—To Pubail to take notes of the amount of damage in the "Ufra" experimental plots.

To Calcutta to arrange for the printing of some coloured plates of jute pests.

January 1917.—To Faridpur to attend Agricultural Exhibition.

To Naogaon to spray ganja attacked by red spider (*Tetranychus sp.*).

February.—To Pusa to attend the Entomological Conference.

April.—To Ghorasal to investigate Rice Hispa and demonstrate bagging.

To Kunipara to investigate Rice Hispa.

To Kurmitola to investigate Rice Hispa.

May.—To Kurmitola to investigate Rice Hispa.

To Targaon to investigate Rice Hispa and demonstrate bagging.

To Akhaura to investigate Rice Swarming Caterpillar and demonstrate remedial measures.

To Dhamrai to investigate Rice Hispa and demonstrate bagging.

To Brahmanbaria to investigate Rice Hispa and demonstrate bagging.

June.—To Chittagong to investigate Rice Swarming Caterpillar and demonstrate remedial measures.

To Dholaiganj to investigate the mango fruit fly and Capnodium and suggest remedial measures.

The chief items of work are noted below.

Observation and treatment of crop pest on the Dacca Farm.

The important pests observed are the following :—

Jute Semilooper (*Cosmophila sabulifera, loc. Chhat poka*).
Indigo Caterpillar (*Caradrina oxigua*).
Behar Hairy Caterpillar (*Diacrina obligua loc. Beechha poka*).
Moth borer (*Chilo sp. loc. Majra*).
White moth borer (*Scirpophaga auriflua*).
Mango shoot borer (*Alcides frenatus*).
The Litchi mite (*Eriophyes Sp.*).
Rice Hispa (*Hispa aenescens, loc. Pamari poka*).
Rice case worm (*Nymphula depunctalis*).
Pea stem fly (*Agromyza Sp.*).
Cotton Semilooper (*Cosmophila eroza*).
Mango weevil (*Cryptorhynchus gravis*).
Pulse Beetle (*Bruchus Sp.*).

Bagging, hand-picking, fumigation, etc., were resorted to to check the ravages of the insects where possible.

The red spider on Ganja.—Spraying with vermisapon was continued.

Training of apprentices.

The life histories of common crop pests were explained to the apprentices who were also shown various entomological operations such as bagging, hand-picking, spraying, fumigation, etc.

Exhibitions.

In the Agricultural Exhibitions at Rangpur and Faridpur the important crop pests were shown and their life histories were explained to the people. The uses of entomological appliances were demonstrated. Short lectures on important insect pests and remedial measures illustrated by magic lantern were also delivered.

Parcels.

A number of parcels of specimens of insects were received and reported on.

Publication.

A number of coloured plates of jute pests have been printed to illustrate a pamphlet on jute pests already written.

P. C. SEN,
Entomological Collector.

REPORT ON THE MYCOLOGICAL WORK DONE FOR THE YEAR ENDING 30th JUNE 1917.

I SPENT 192 days on tour during the year under review.

I visited Bakarganj, Faridpur, Madaripur, Gopalganj, Goalundo, Vikrampur, Kurmitola, Pubail, Nagari, Ghorashal, Polash, Kaliganj, Joydebpur, Narainganj, Chaumuhani, Begumganj, Lakhipura, Comilla, Laksam,

Khulna, Haldibari, Chinsurah and Rangpur in connection with the outbreak of fungus pests and the Eelworm (Ufra or Dak) disease of paddy and also to supervising the Ufra experiments started in different centres. I also attended the Mycological Conference at Pusa.

Babu Kali Prosonna Rai, L.AG., who worked as an Assistant Mycological Collector from September to February last also spent 95 days on tour surveying the Ufra infected tracts of Faridpur and a portion of Barisal Sadar Subdivision. He also supervised the Ufra demonstration work.

The most important work done by this section during the year under report is the experiment on lines, recommended by the Imperial Mycologist to check Ufra.

This consists of (*1*) burning of stubble, (*2*) thorough cultivation, (3) sowing of good heavy seeds preferably selecting in salt-solution.

For the experiment, lands that had previously suffered much had been selected at Kurmitola and Pubail in Dacca and Laksam in Tippera.

This work was practically conducted by the Collectors of Dacca and Tippera under the guidance of the Agricultural Department.

The disease did not appear in any of the plots at Kurmitola and Laksam, whereas it occurred in the Pubail experimental area.

The same experiment has been repeated this year on a large scale in collaboration with the district agricultural staff in different centres, viz., Kurmitola, Pubail, Nagari and Vikrampur in Dacca and Gopalganj in Faridpur.

Rai A. C. Roy Bahadur of Laksam has also repeated the same experiment in his own land where the Collector of Tippera did last year.

An experiment to test the immunity of *Digha Dhan* is also being tried in the Ufra infected area side by side along with the local paddy that is said to be more susceptible to the disease.

A detailed Ufra survey of the districts of Bakarganj and Faridpur was commenced last cold weather 1916-17, and a large area of low-lying land in both the districts has been found to be infected with Ufra. Gopalganj mentioned above is the centre of one of the largest infected tracts in Faridpur.

Bengali leaflets on Ufra or Dak disease of paddy and describing the remedial measures recommended have been distributed in the affected area.

The *Dhashadhara* and *Haitamara* banana disease of Hooghly and Munshiganj respectively of which Fusarium, a fungoid disease, is probably the cause, will be studied this year in conjunction with the First Assistant of the Imperial Mycologist.

A fungus disease, *Corticium sp.*, has been found on *ganja* at Naogaon in Rajshahi. Further study of the disease will continue in the next cold weather.

As a routine work, farm crops were kept under observation. The following fungus pests were observed in the Dacca Farm in the year under review:—

Macrophoma on jute.	Phytophthora on agave.
Rhizoctonia on jute.	Colletotrichum on agave.
Rhizoctonia on cowpea.	Ustilogo sacchari on sugarcane.
Rhizoctonia on sugarcane.	Colletotrichum on sugarcane.
Uromyces on cowpea.	Fomes lucidus on areca palm.
Colletotrichum on cowpea.	Oidium on gourd.
Oidium on cowpea.	Uredo fici on fig.
Oidium on mustard.	Gloesporium on mango.

Capnodium on mango.

Specimens of diseased crops received from other farms were examined and reported on.

AMRITA LAL SOM,
Mycological Collector.

ANNUAL REPORT ON SERICULTURAL OPERATIONS DURING THE YEAR ENDING 30TH JUNE 1917.

THE general control and the management of the operations in Bengal continued, as usual, in the hands of the Bengal Silk Committee, consisting of the Director of Agriculture, Bengal (President), the Collectors of Murshidabad and Malda and two representatives of Messrs. Anderson, Wright & Co. and the Hon'ble Mr. G. H. C. Ariff.

During the year under review, the Committee held three regular meetings (attended by visitors who are interested in the silk industry).

Administration.

I remained in charge during the year.

Mr Probhat Chandra Chowdhury, Superintendent of Berhampur Central Nursery, was in charge of the Cross-breeding Experiments in addition to his duties in the absence of Mr. E. Grangeon.

Disinfection of village rearing-houses and raising seed necessary for the province through the selected rearers.

The disinfection of village silkworm rearing-houses which was introduced by me in the year 1910 has been carried out successfully.

Supervisors, under the supervision of the Nursery Superintendents, were employed to disinfect, with strong copper-sulphate solution and sulphur fumigation, the houses and furniture at a few "selected" professional rearers' houses and microscopically examined their seed (moths) in the same way as is done in the Nurseries.

Copper-sulphate worth Rs. 71-9-9 for disinfection and sulphur worth Rs. 102-10-3 for fumigation were supplied to the rearers from the Malda godown at cost price with necessary instructions.

Tours.

I spent 297 days on tour and inspected the nurseries as often as possible.

The points which especially engaged my attention were—

(1) The production of disease-free seed from the Nurseries and the houses of the "selected" professional rearers, (2) comparison of the results obtained from the Nursery seed with those obtained from the "selected" rearers' seed, (3) whenever I visited the "selected" rearers' houses during the crop and the spinning of their outturns, I called in their neighbours to see the results as a result of which they have now thoroughly understood the importance of rearing examined seed in improved houses and of adopting the methods recommended, (4) disinfection of the selected rearing-houses and the fittings used in them, (5) the extension of the area of mulberry plantations, (6) the manuring of the mulberry lands as much as practicable, (7) the planting of "selected" mulberry in Nurseries and supply cuttings to the ryots as far as practicable, (8) the improvement of ordinary village rearing-houses by adding ventilators and windows for light, air and dry floors and (9) improvement of the mulberry soils of Birbhum district by a mixture of sand which has proved to be most successful at the Kalitha Central Nursery, and is being introduced in the village rearers' lands.

Inspection.

The Director of Agriculture, Bengal, inspected some of the Nurseries twice during the year under report.

The Collectors of Murshidabad and Malda visited the Piasbari Central Nursery on one occasion. The Collector of Malda visited Amriti Central Nursery twice. Messrs. Goodman, Malcolm and De Minvielle, Members of the Silk Committee, visited the Piasbari Central Nursery on one occasion.

Mr. Lefroy, the Imperial Silk Specialist, inspected the Piasbari and Berhampur Central Nurseries on one occasion.

The late Collector of Murshidabad inspected the Kumarpur and Chandanpur Central Nurseries on one occasion.

Mr. Lefroy, the Imperial Silk Specialist, also inspected a few rearing villages with the Director of Agriculture, Bengal, and the Members of the Silk Committee.

The present condition of the Silk Industry in Bengal.

The price of Khoongroo (Home reel) silk during the year under report rose from Rs. 16 to Rs. 21, while green cocoons were sold up to Rs. 60 per maund, an increase in the price never experienced during the last 31 years in Bengal. There has been, in consequence, an increase in the land under mulberry.

Nurseries.

The following is a list of the Nurseries in operation during the year :—

(1) Berhampur Central Nursery, containing 7 rearing-houses with 69 bighas, 4 cottahs and 10 chhittaks of mulberry lands, of which 10 bighas were set apart for experimental purpose.

(2) Piasbari Central Nursery, containing 5 rearing-houses with 67 bighas, 4 cottahs and 12 chhittaks of mulberry lands, of which 4 bighas have been uprooted and planted with "selected" mulberry at intervals of 3 to 4 feet apart. About 2 bighas more have been prepared to plant "selected" mulberry at every 3 to 5 feet apart.

Construction of a small rearing-house has been commenced to rear more seed during the favourable seasons, while the growth of mulberry is more and production of mulberry is being increased by heavy manure of tank weeds ("Bhodes") and very good silt.

(3) Amriti Central Nursery, containing 4 rearing-houses with 82 bighas and 14 cottahs of mulberry lands. About one bigha old mulberry land have been utilized for foot paths and the construction of a new rearing-house.

About 2 bighas of waste land are being prepared for planting "selected" mulberry at every 5 feet apart.

Two small new rearing "tatti" houses are under construction to rear more seed.

Difficulty is being felt here for manure. No silt or tank weeds are available, castor cake and cowdung being used as much as funds permit.

(4) Kumarpur Central Nursery, containing 4 rearing-houses with 38 bighas, 7 chhittaks and 3 gondas of mulberry lands, of which 7 bighas of old mulberry were uprooted and planted with "selected" mulberry at every 3 to 5 feet apart.

The lands of this Nursery have been much improved by manuring.

(5) Chandanpur Central Nursery, containing 4 rearing-houses with 41 bighas, 1 cottah and 4 chhittaks of mulberry lands, of which 10 bighas were planted with "selected" mulberry at 4 to 5 feet apart.

The lands have been much improved by cowdung manure throughout the year.

(6) Kalitha Central Nursery, containing 4 rearing-houses with 51 bighas, 13 cottahs and 10 chhittaks of mulberry lands.

The soil in this Nursery has always been too hard to dig owing to the dry season. An experiment in my own garden at Berhampur showed that a dressing of river sand was effective in loosening the soil and as mentioned above this practice has been successfully introduced into the Nursery and is being followed by the surrounding villagers as well. Castor cake manure, after the mixture of sand, further improves the land and the good results will be obtained during the coming year.

(7) Mirganj Central Nursery, consisting of 61 bighas, 16 cottahs and 8 chhitaks of mulberry lands. The land is poor, but is now being heavily manured.

(8) Bogra Nursery, containing six small rearing-houses with 29 bighas, 15 cottahs and 12 chittaks of mulberry lands.

Exchange of seed between the Nurseries.

The Piasbari Central Nursery was started in order to supply pure Nistari seed to all Central Nurseries in other districts, while Mirganj Central Nursery is supplying the Nistari seed to Piasbari and Amriti Central Nurseries.

The Bogra Nursery was started for supplying pure and disease-free Chhotopoloo seed to all the Central Nurseries and to take its seed from the rearers, houses to whom Nursery seed were supplied.

Supply of Nistari and Chhotopoloo seed.

Pure bred Nistari free from disease was reared in all the Central Nurseries and the outturn was mostly disposed of as seed-cocoons and eggs, which have been highly appreciated by all ryots. Those who purchased the Nursery seed obtained successful results and never hesitated to offer the highest prices ever known in Bengal.

Chhotopoloo seed were not distributed owing to a lot being condemned and through the entire crop of mulberry in every Nursery during the last *Aswin* crop being spoiled by rains and cyclonic weather.

The total receipts from the outturn of Nurseries from 1st July 1916 to 30th June 1917 were as follows :—

		Rs.	A.	P.
Sale-proceeds of seed cocoons		23,869	9	1½
Ditto cocoons		3,643	2	3
Ditto rejected cocoons		241	12	6
Ditto mulberry leaves		903	7	6
Ditto miscellaneous articles ...		79	4	6
Total ...		28,737	3	10½

The figures for the two previous years are as follows :—

	Rs.	A.	P.
1914-15	13,069	1	9
1915-16	16,828	8	4½

In comparing the last three years' figure given above, it will be seen that there has been a considerable increase in the production of seed and revenue. This is due to the opening of the Piasbari and Amriti Central Nurseries which have given a revenue of Rs. 9,207-15 and Rs. 5,591-13-3, respectively. These represent about half of the revenue of the year under report.

The details of the sale-proceeds of the outturn of each Central Nursery during the year under report are noted below :—

Name of Nursery.	Seed-cocoons.	Rejected and pierced cocoons.	Cocoons.	Mulberry leaves.	Miscellaneous.	Total price obtained.
	K. P. G	K. P.	K. P. G.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Piasbari Cental Nursery.	3,007 10 0	146 0	337 13 0	21 0 0	13 0 0	9,207 15 0
Amriti Central Nursery.	2,273 1 9¾	105 5	204 2 0	96 9 6	...	5,591 13 3
Berhampur Central Nursery.	1,151 8 3½	179 5	1,811 7 17½	499 8 0	10 0 0	4,832 15 9
Kalitha Central Nursery.	602 8 9	5 0	361 14 0	32 12 0	19 13 0	1,571 4 0
Mirganj Central Nursery.	744 4 0	105 4	500 5 0	.....	9 0 0	1,808 7 0
Kumarpur Central Nursery.	1,310 15 9	79 1	224 9 0	153 10 0	13 10 9	3,003 15 1½
Chandanpur Central Nursery.	1,294 6 8	105 14	267 3 4	100 0 0	13 12 9	2,720 13 9
Total ...	10,384 5 19¼	725 13	3,707 6 1½	903 7 6	79 4 6	28,737 3 10½

The only way of doubling the production of the nursery seed is to (1) heavily manure the mulberry fields, (2) find out some sure remedy for the attack of "Tukras" which ruins a whole crop in the nursery, and (3) owing to short of funds, cheap sort of "Tatti" rearing houses are under construction and it is contemplated to extend more, shortly.

The total expenditure of the nursery including the office establishment from 1st July 1916 to 30th June 1917 are as follows :—

	Rs.	A.	P.
Salaries	5,560	0	0
Pay of the establishment	18,346	14	7
Travelling allowance of the Superintendent ...	1,953	14	6
Ditto expenses of the establishment	2,950	11	6
Stipends	322	13	0
Petty repairs and construction	10,089	0	5
Rates, rents, and taxes	1,914	3	2
Rewards to nurserymen	216	0	0
Cultivation charges	37,437	1	9
Disinfection charges	2,097	5	9
Miscellaneous	10,473	2	6
Total ..	91,361	3	2

Training of the sons of Professional rearers.

Sericultural instruction was continued at the Rajshahi Sericultural School and at the Sericultural class of the Berhampur Central Nursery from which 11 and 2 students have successfully passed during the year.

All the passed students have constructed their model rearing-houses and some of them have been most successful in rearing seed and selling their outturns as seed.

Industrial exhibition.

Sericultural exhibits were shown at two industrial exhibitions, one at Banjetia in the Murshidabad district and another at Suri, the headquarters station of the Birbhum district, where the Superintendent of Sericulture, Bengal, was present.

A. C. GHOSE,

Superintendent of Sericulture, Bengal.

REPORT ON THE WORK DONE AT THE SERICULTURAL RESEARCH STATIONS (BERHAMPORE, KURSEONG AND KALIMPONG) DURING THE YEAR ENDING 30TH JUNE, 1917.

IN my previous reports I have dwelt at length on the various races of silk-worms with which experiments are being carried on. Various crosses were effected and studied, and as a result we have been able to derive two types which show very hopeful signs. A trial was made at Ramnagar by Mr. deMinvielle with one of our cross races, Madagascar male X Nistari female at the 20th generation from the outturn of the December crop 1916.

Mr. deMinvielle's report.

(Resolution No. 410 of the Bengal Silk Committe, dated, Berhampore, the 6th March, 1917) :—

"410. A preliminary report by Mr. deMinvielle on the trial of one of the Berhampore Madagascar—Nistari crosses at Ramnagar was discussed. Although final spinning tests had not been completed the results were distinctly promising in certain directions. The silk-worms had been very

healthy throughout and the cocoons produced were uniform in colour, size and quality.

The chief defect, as in the cross-bred race of Miss Cleghorn's tried last year, appeared to be in the irregularity of the time of hatching—about half the worms hatching out later than the usual period taken by pure bred Nistaris. The attention of the Superintendent of Sericulture, Babulbona, was drawn to the necessity of establishing 'uniformity of incubation' in this race. Otherwise the race appears to be quite suitable for general use in the district, and if the spinning tests come up to expectations, should prove of the greatest value. In order to provide a wider field for selection the operations of the breeding section will however require to be extended."

Reason for this irregularity in hatching.

From this report it will be seen that the hatching is not uniform. In my last year's report I mentioned a case of reversion at the 20th generation with another lot of Madagascar male X Nistari female cross where "more than three-fourths of the larvae reverted to the old Zebra type." This is a curious analogy. With this lot very strict selective measures were adopted with regard to the larval markings, yield, colour and form of cocoons. The races were perfectly multivoltine, but they showed this reversion at this particular stage. Mons. E. Grangeon noticed a case of reversion when he crossed Madagascar female X Nistari male. The account is given in his report for 1913.

"First case—Crossing between a (female) pure Madagascar and Nistari male.

This crossing does not give more than 25 per cent. of hatching out at the first generation The same result is obtained at the second generation. This fact is surprising. It seems that the crossing reveals the ancestral character of the monovoltine lost since 50 generations. In fact the polyvoltine race of Madagascar originates from a crossing between a polyvoltine and a univoltine. The second generation gives 50 per cent. of hatching, the third polyvoltine."

The "pure Madagascar" race used in our crossings.

The "pure Madagascar" race is a multivoltine race derived from a European univoltine race by crossing with a multivoltine race and introduced into Madagascar by the French Government. There is also a native silk-worm race of Madagascar—Brocera Madagascarensis—which "is a very close relative of the mulberry silk-worm, and in the native country feeds upon the mulberry. It is, however, far inferior to the common mulberry worm". But this race known as "Pure Madagascar" is a beautiful race and yields cocoons of excellent quality (weight of cocoons without chrysalis averaging between 4 to 5 grains). Besides, the cocoons of the "Pure Madagascar" show different shades of colour and even different colours. In the lot received by Mons. F. D. Lafont in 1912, he obtained 20 cocoons out of which 18 were pale yellow and 2 white. In another lot imported in November 1913, the cocoons were white and greenish white. This difference in colour in the cocoons from the same lot is another indication of crossing. As defined by Bateson, "The individual to be altogether pure-bred must be homozygous in all respects". The "Pure Madagascar" is therefore pure for certain characters only.

Mons. Prudhomme in his "La Sericulture aux colonies" deals with different varieties of silk-worm races in Madagascar. These varieties are mostly derivatives of crosses. Six principal varieties were thus obtained and were introduced to the rearers for cultivation. From Mons. Prudhomme's report it can be safely concluded that the designation "Pure Madagascar" which was applied to the races imported directly from Madagascar cannot be applied in the strict sense of the term.

Exceptions.

Side by side with this Madagascar male X Nistari female cross we have another type—Accidental Bivoltine male X Nistari female which did not

exhibit any such case at the 20th generation. But for the latter it may be said that the stock races were pure for these characters.

Davenport.

To quote Davenport "Inheritance is from the race. It is evident that inheritance is not limited to the visible characters of the immediate parent. We constantly forget that every individual is possessed of and capable of transmitting all the characters of the races to which he belongs. We forget that his visible characters are not his total possession but only those which are relatively most prominent in his case. Other combinations are easily possible out of the same elements in slightly different proportions and it is not so strange as we think that a character once in possession of a race tends to persist indefinitely and perforce, occasionally to become visibly apparent. It is bound to appear, under the law of chance, as is the one black ball in the box of a thousand or a million if only throws enough are made."

Reversion not retrograde.

These cases of reversion to one ancestral character at this 20th generation with this particular cross type offer good examples for reflection. In the one case the reversion was towards the larval markings which can be taken as a case of meristic variation whereas in the present case I would interpret it as a case of functional variation, in that the function of hatching is affected.

Are we to consider this as a serious objection to the continuation of this stock? For it may be inferred that the same defect may be observed from time to time and even make it impossible to fix the type. I remarked in my last report the fixation of a type requires long and patient watching through many generations of rearing before it breeds true. This aberration from the original direction need not be considered a retrograde step. "The aim of crossing is the combination of the desirable qualities of two or more species and varieties into one strain, and the elimination of the undesirable characters." Rigorous selection in every particular has to be adopted. In the present case, since December 1916, by rejecting the layings which showed any signs of univoltinity we have been able to get the races to become multivoltine within three generations. These races are at the 23rd generation at present. It may not be altogether out of place to state that the change in the colour of eggs is the index to the voltine character of the races. A univoltine laying changes colour the day after the laying of eggs; whilst the multivoltines, *e.g.*, Nistaris and Chotopoloos change colour on the day before hatching. So that by eliminating any laying changing colour on the day after they are laid, we may expect to exclude to a great extent the undesirable factors and by careful selection during successive generations the race can be made perfectly multivoltine. Altitude, moisture, heat and light are other factors playing a great influence on silk worms. The vigour and yield of a race are greatly affected by these environmental conditions. Our experiments in the hills have clearly demonstrated the advantages derived by rearing in the hills at a period when the rearing in the plains is marked with these degenerating influences on the crop. The tables shown in this report as well as in the previous reports will verify the statement.

Hill Stations.

The original idea was to test the races in the hills during the period from May to September, as the conditions in the plains are not suitable for successful rearing during these months. But our experiments have shown that better results are noticed by beginning the work in the hills from the middle of March and continuing there till the end of September or middle of October. Special experiments were conducted to ascertain whether better results are obtained from the lot continuously reared in the hills during this period and subsequently reared in the plains from October to March or whether the intermediate lots derived from successive lots and brought down to the plains at the end of that crop are better. Our experiments have enabled us to infer that the intermediate lots are successful only for two

subsequent generations in the plains and then degenerate greatly. But the lots reared from March to October in the hills consecutively and brought down to the plains to be reared from October to March preserve their vigour and yield of silk, etc., without any marked degeneration. The effect on the races brought down from the hills, say in May, after one rearing in the hills from March to April is as follows:—There will be quite a successful crop in May in the plains but the next generation from the seed of the May crop will be less vigorous and in the third generation it will degenerate so much as to be of no value for seed for subsequent crop. But the case with the lot brought down in October after being reared in the hills from March to September will be quite satisfactory for subsequent generations. Consequently we have preserved a number of lots of each race. These are reared separately and by families, in order to observe carefully the merits and demerits so as to arrive at a definite conclusion as to the best course to be adopted. The lot supplied to Mr. deMinvielle was derived from one of these intermediate lots, as the other lots had already spun out and could not be supplied on to the date wanted by him. The yield of silk in this lot is accordingly expected to be less than what would have been the case with the lot reared in the hills consecutively from March to October from which we expect subsequently to evolve the race for our seed purposes.

June-July crop, 1916.

A COMPARATIVE STATEMENT OF RACES REARED THROUGHOUT THE YEAR IN BERHAMPORE WITH SAME RACES REARED IN KURSEONG DURING MAY 1916 FOR ONE CROP AND AGAIN REARED IN BERHAMPORE IN JUNE 1916.						RESULTS OF REELING AT THE ROSE FILATURE CONCERN, RAMNAGAR, COMMUNICATED BY MR. J. DEMINVIELLE.		
Serial No.	NAME OF RACES.	Average number of eggs per laying.	Percentage of yield per laying.	Weight of silk substance in one cocoon.	Number of cocoons in 1 seer.	Average Kahans of cocoons to a seer of silk.	Number of cocoons to form 12 to 14 deniers.	Particulars.
			Per cent.	Grs.		K. P. G.		
1	Accidental Bivoltine male crossed with Nistari female 16th generation. Reared throughout the year in Berhampore.	399	55	2 to 2½	830	9 0 8¾	7 to 8 cocoons	Yield above standard.*
2	Accidental Bivoltine male crossed with Nistari female 16th generation. Seed obtained from Kurseong in June and reared in Berhampore.	409	54	2½ to 2½	760	8 11 5	Ditto	Ditto.
3	Madagascar male crossed with Nistari female, 16th generation. Reared throughout the year in Berhampore.	401	54	2½ to 2½	885	10 0 0	Ditto	Ditto.
4	Madagascar male crossed with Nistari female, 16th generation. Seed obtained from Kurseong in June and reared in Berhampore.	485	58	2 to 2½	780	9 0 0	Ditto	Ditto.
5	Pure Nistari. Seed obtained from Kurseong in June and reared in Berhampore.	410	60	1½ to 1½	1,050	13 6 0	8 to 9 cocoons	Ditto.
6	Pure Nistari. Reared throughout the year in Berhampore.	300	56	1	1,120	23 9 0	10 to 11 cocoons	Yield below standard.

* The silk is on the whole of a good quality and compares most favourably with silk from local cocoons. The only exception is the pure Nistari by selection throughout the year in Berhampore.

(Sd) J. DEMINVIELLE.

The 31st July 1917.

August Crop, 1916.

Name of Races.	Kurseong Research Station.		Berhampore Research Station.	
	Percentage of yield per laying.	Weight of silky substance in one cocoon without chrysalis.	Percentage of yield per laying.	Weight of silky substance in one cocoon without chrysalis.
	Per cent.	Grs.	Per cent.	Grs.
1. Accidental Bivoltine Male X Nistari female.	52	2½ to 3	46	1½ to 2
2. Madagascar Male X Nistari female.	60	2½ to 3¼	51	1¾ to 2
3. Nistari	60	1½ to 2	51	1 to 1½

September Crop, 1916.

	Per cent.	Grs.	Per cent.	Grs.
1. Accidental Bivoltine Male X Nistari female.	67	2 to 3	49	2 to 2¼
2. Madagascar Male X Nistari female.	68	2 to 2½	56	2 to 2¼
3. Nistari	66	1½ to 2	55	1 to 1½

October 1916 to March 1917.

From October to March the results were quite consistent with a minimum yield of 2 grains and maximum 3 grains for these crosses and the percentages of yield per laying were 70 to 75 per cent.; whilst Nistari was showing an average between 1½ to 2 grains with a percentage of yield varying from 65 to 72 per cent.

Intermediate lots.

The above results apply to the lot which was reared all throughout in the hills from April 1916 to September 1916. But the intermediate lots were showing only an average of 1 to 1½ grains from January to March 1917.

March 1917 to June 1917.

Two crops have been reared at Kurseong during this year from March to June. The lots which had gone down so much as to yield only 1½ grains of silk have again come up to their original standard of 2 to 2½ grains simply by this change in the hills. The average yield of the races at present may be taken to be 2½ grains per cocoon without chrysalis.

The races are being brought down in the plains and reared. A witness lot is kept in the hills to enable us to make a comparative study in detail. This work will be continued in the hills up to October.

From Kalimpong the first outturn has been obtained this month. The good effect of the change is manifest in the lots sent there. The yield is between 2 to 2½ grains, whereas in the plains the witness lots are showing only 1½ grains of silk per cocoon.

Observations.

In each of the above races the cocoons are yellow in colour like those of the indigenous races and the worms are selected in order to resemble the Nistari or Chotopoloo worms in their larval markings. All these races were evolved by Mons. E. Grangeon in 1914. But there is another type obtained from Madagascar male X Nistari female, with Zebra worms since Mons.

Lafont's time in 1912. This race is at the 32nd generation at present It may be seen from the above tables that there has been an appreciable increase in every case by this change to the hills. The special note-worthy feature is the improvement in the Nistari. This is striking and proves the necessity of a big station in the hills in future even if the cross types are not fixed.

Present method adopted in Europe.

M. Viel's opinion.—In sericulture the term crossing is used to denote the sexual union of two individuals of different types or even of simply different localities without even pre-occupying oneself with the knowledge as to whether the couples are of the same species or race or even of the same variety. For example, by coupling a female of a Chinese race of white cocoons with the yellow var, a crossing is obtained. By coupling a moth of yellow var, reared in a room under elevated temperature with another moth of the same race but selected from the lot reared in another region in lesser temperature a crossing is effected.

The good effect of crossing is specially manifest in the crossings made between yellow var and Chinese golden yellow. The var is a race with big worms of slow growth and consequently more susceptible to Flacherie; the cocoons are big and floss is considerable. Whereas the Chinese golden yellow race consists of small worms of rapid growth and less susceptible to Flacherie. The cocoons are smaller but yield very little floss. By a crossing between these races an intermediate form is obtained which becomes highly resistant to Flacherie. The size of the cocoons is no doubt intermediate, but the quantity of floss is considerably decreased. So that the rearing of this crossed type is more advantageous than the rearing of either of the races in a pure state. No pure race can be completely satisfactory to the rearer or to the reeler. The present practice in Europe therefore consists in rearing the seed of the first generation of the crosses for industrial purposes in order to remove the defects of the pure races by suitable crossings according to their particular requirements. By rearing seeds of the first generation the difference in the colour of cocoons is avoided.

Lines for research.

By rearing the Nistaris in the hills we can even improve the local races by crossings with males derived from the hills. There is no doubt a similar custom prevalent in the plains *i. e.*, a rearer generally gets his seed from another district. This has no doubt some good effect in that the quality of the aliment is changed and it may be for the better. This change is not so appreciable between Maldah and Murshidabad. The results obtained in the hills with this indigenous race leads me to hope that there is a considerable chance for the betterment of these races by this system, in addition to the method of crossing. Both these methods will be tried in the coming year.

Kalimpong.

At the suggestion of the Revd. Dr. W. S. Sutherland I visited this place and submitted a proposal for the starting of a nursery for the Research section there. The Director of Agriculture, Bengal, visited Kalimpong and sanction was given to this proposal. We have constructed a small rearing-house and three acres of land have been lent for mulberry plantation. I take this opportunity to express my thankfulness to the Revd. Dr. W. S. Sutherland for his help and also for the kind interest he is taking in this concern. There can be no doubt that there is a great possibility of developing the silk industry in these places. The conditions seem to me to be very promising. The results of the experiments hitherto conducted by the Rev. Dr. W. S. Sutherland in his own nursery are full of encouragement. We are going to try our races there in the same way as had been done at Kurseong and after a comparative study has been made between the results at these two places it may be well to decide the situation for a bigger establishment.

Mr. N. G. Mukherjee in his "Hand Book of Sericulture" speaks of Morus Serrata and recommends planting it, saying that seed may be obtained from Kalimpong (page 15). Morus Serrata is not found here. Mr. Mukherjee in page 2 of this book gives a short description of it. From this it is evident that it is Morus Laevigata that is meant. "The fruit of Morus Serrata" he says "is five or six inches long." This is Morus Laevigata, The fruit of

Morus Serrata is under three inches long. The Morus Alba to which he refers in the same paragraph as growing chiefly at an elevation 3,000 or 4,000 feet is our Morus Indica. The opening sentence of his book is "There are many kinds of mulberry, of which Morus Alba (varieties Indica and Laevigata) and Morus Serrata grow wild in the Himalayas." It is Morus Indica and Laevigata that are found in this district, Morus Indica being called by the people "Chhota Kimbu" and Morus Laevigata "Bara Kimbu."

There is a great scope for selection in this line and also of experiments with the various kind of leaves as to their suitability for silk worms.

Other experiments.

A "note on recent investigations of causes underlying incidence of Pebrine in India" by Mr. C. M. Hutchinson, Imperial Bacteriologist, Pusa, has been published. This brings to light many defects in the system of microscopic examination of moths practised in the nurseries. It clearly shows how defective the work had been, for want of a proper knowledge of Pebrine and its development under Indian conditions. I am glad to mention that Mr. Hutchinson had kindly spared his Assistant to show us his system of examination. This work will be taken up in the Central Nursery as well as in the Research as soon as arrangements are made. A very instructive Bulletin on "the Pebrine disease of silk-worms in India" by Mr. Hutchinson has been published. It contains a detailed description of the system which we are going to adopt.

Mr. Hutchinson has also pointed out the defective condition of the rearing houses, especially for proper disinfection. An experiment with paper ceiling as recommended by Mr. Hutchinson will be conducted at the Research section.

Comparative tests with disinfectants such as Formalin and copper sulphate as regards their efficiency for killing Pebrine spores and other disease germs will also be made.

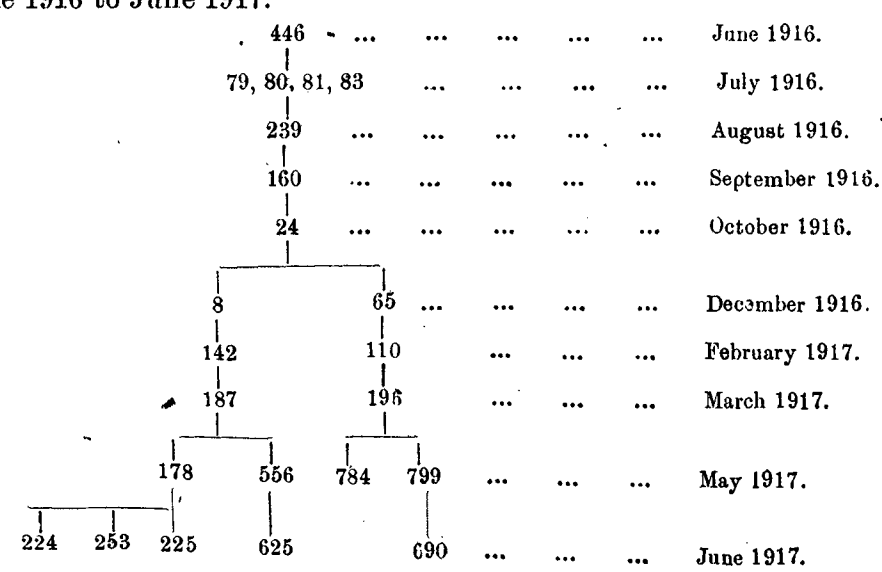
PRABHAT CHANDRA CHAUDHURI,

Supdt. of Sericulture, Berhampore, in charge Seri. Research, Berhampore.

BERHAMPORE,
The 10th July 1917.

ANNUAL REPORT ON SCIENTIFIC WORK IN CONNECTION WITH SILK FOR THE YEAR ENDING 30th JUNE 1917 DONE BY MISS. M. L. CLEGHORN, F.L.S., F.E.S., F.Z.S.

THE hybrid race between the Italian-Japanese and Nistari started in 1911 has continued to be reared on a large scale and is now in the 54th generation. There are six groups of this hybrid race being reared separately. The following table gives the pedigree with the dates of each *élevage* of the group 303 from June 1916 to June 1917.



A few families of group 303 were issued to the rearer (who works according to his own methods at the control rearing-house) and he considers them very vigorous: owing to the small death rate among them he asked if in this race three worms hatched from one egg. He also noticed that they did not consume more leaf than the Nistari. He sold the cocoons he obtained from this 303 group at Rs. 1-9 per kahan.

When compared with Mysore cocoons I found that eleven pierced cocoons of the 51st generation of my 303 set reared at Alipore were equal in weight to 14 cocoons of the Mysore race reared in Mysore.

I find there are about 10 generations in the year, and probably the temperature is the highest at which worms are reared in India but the advantage gained by rearing the worms under these conditions is that when sent to any of the silk districts they must give better results.

By rigorous selections for longevity and under good hygienic conditions this race of silkworm is practically immune to pebrine. My father the late Mr. James Cleghorn as far back as 1888 pointed out that in India when dealing with a multivoltine race microscopic selection for pebrine was useless in forming a rigorous and uniform breed. None of the moths of this race are selected microscopically, but all the moths as soon as they die are saturated with a drop or two of kerosine oil. These saturated moths are then all taken up from the laying sheets and burnt and only layings of the longest lived and liveliest moths are cut out and kept for seed.

Dr. Sutherland of the Scottish Universities Mission, Kalimpong, still has some of my hybrid race going at Kalimpong from eggs of the 44th generation which I sent him in May 1916. This hybrid multivoltine race remains quite multivotline in the plains, but in the hills becomes univoltine at the approach of winter, and its advantage over a pure univoltine or multivoltine is that it would give about two or three good crops during the summer in the hills, while the univoltine would only give one crop and a multivoltine such as the Nistari would completely die out at the approach of winter.

My father's variety of thin sweet-leaved fruitless mulberry still continues to give good results and I have obtained heavy crops of leaf from it throughout the year.

M. L. CLEGHORN.

ALIPORE, CALCUTTA:
The 14th July 1917.

ANNUAL REPORT ON THE WORKINGS OF THE SERICULTURAL SCHOOL, RAJSHAHI, FOR THE YEAR ENDING 30TH JUNE 1917.

The school was made over to Government in January 1907. Since then it is being managed by a Managing Committee under the Director of Agriculture, Bengal.

The school teaches practical methods of:—

(*a*) Microscopic cultivation.
(*b*) Microscopic seed selection.
(*c*) Detection and prevention of silk-worm diseases.
(*d*) Rearing of silk-worm.

The school is in possession of 22 bighas of land at Kadirgunj within a mile from the school; of this 17 bighas are under mulberry cultivation against 16 bighas of the previous year.

The cocoons grown in this school are gaining popularity among the Bushnies. They take cocoons from this school for their seeds.

Two crops of cocoons were raised in this school during the year under report, namely, in July 1916 and April 1917 amounting to 291 kahans and 4 pons of seed-cocoons of which 6 kahans were kept in the school for the microscopic examination of the students and the rest was sold to the Bushnies of different joars. The receipt was Rs. 185-4 against Rs. 438-6 of the previous year. The other two crops in September 1916 and January 1917 were not raised for the following reasons. The former could not be reared for want of mulberry

leaves owing to excessive rains and the latter was rejected under the instruction of the Superintendent of Sericulture, Bengal.

Teaching staff.—There is a headmaster who teaches Sericulture and with the help of a rearer practical rearing is taught. The headmaster from time to time visited the model rearing-houses of passed students and gave instructions to the village Bushnies regarding silk-worm rearing.

Model nurseries.—Have been started by the ex-students of this school and arrangements have been made to inspect the nurseries and to see how they make profit by silk-worm rearing. Quarterly reports of these model nurseries are called for and received. They show that the nuseries are doing well.

Students.—There were 12 boys in the beginning of the year; 12 appeared in the final examination and 11 passed; they would receive their rewards in the next winter; one boy of the previous year received reward of the 2nd instalment. There were 10 boys on the roll on the 30th June 1917; 3 of whom are Mahomedans and 7 Hindus. The students cultivate a plot of land measuring 1 kottah each.

Microscopes.—There were 15 microscopes of which 4 were given to the students in the year under report and 11 are now in stock.

Half-yearly Examination :—The half-yearly Examination is just over, the result of which has not yet been out.

Receipts.	Rs.	*Expenditure.*	Rs.
Sale-proceeds of seed-cocoons	185	Establishment	876
Government	6,376	Stipend	981
		Appliances	417
Total ...	6,561	Book and maps	20
		Annual repairs including petty repairs.	443
		Furniture	12
		Rewards	850
		Rents, and taxes	145
		Contingencies	2,817
		Total ...,	6,561

Discipline :—No case of breach of discipline has come to the notice of the school authorities in the year under report.

Visitors :—The school was visited by—

The Superintendent of Sericulture, Bengal, on 2nd July 1916.
The Director of Agriculture, Bengal, on 13th February 1917.
The Superintendent of Sericulture Bengal, on 28th June 1917.

Meetings :—The Managing Committee held four meetings during the year under report.

K. BANERJI,

Secretary, Sericultural School.

RAJSHAHI,

The 6th Juy 1917.

No. 59, dated Calcutta, the 11th July 1917.

From—N. N. PILLAI, Esq., Weaving Master, Bengal,
To—The Director of Agriulture, Bengal.

WITH reference to your memo. 4709-12, dated 7th June 1917, I have the honour to submit the following report regarding the work done by me from 1st July 1916 to 30th June 1917.

During the year ending with 30th June 1917, I spent 323 days on tour to attend to works as detailed below. Before describing them I beg to submit a brief introductory account of the measures taken by me towards the improvement of the existing backward state of textile industries in Bengal, with

which I am placed in direct and close contact. During the year under review and prior to it, the textile artisans of this province have been fully induced to realize the importance of adopting improved manufacturing appliances and accessories by successfully conducting such practical demonstrations that fully suited the local circumstances of the weavers in general. As the result of my earnest endeavours the artisans in turn have begun to show their willingness to improve themselves and to follow my instructions as far as their circumstances could permit. From the peripatetic demonstrations on weaving and reeling conducted by me in almost all the selected centres in Bengal I have had enough of occasions to make a preparatory study of the conditions and requirements and drawbacks of the weaving and reeling population, and to conclude as to what measures, if adopted, would be beneficial to them and would be willingly admitted by them. The weavers are invariably found heavily indebted to their mahajans who keep them under their clutches and live upon the legitimate profits of those poor victims. The mahajans being quite averse to see the condition of their debtors bettered in any way, exert every influence in creating an erroneous impression in them regarding every kind of innovations. And so, an outsider who approaches them with the object of bettering their condition has, naturally, to fight against their inherent conservative notions aided by the misrepresentations of those anti-working parties, before they are completely brought round. The weavers in general are very conservative and are proverbially poor; and excepting in Burdwan and part of Rajshahi divisions, only primitive looms are in vogue. The condition of the Bengal weavers is quite unlike those of other parts. Most of the weavers are agriculturists as well. Probably, this may be one of the reasons why they show an indifferent attitude towards the improvement of their home industry. Their wants being few, they consider the industry as secondary only. The three great industrial requirements which the weavers keenly suffer from are :—

(1) supply of genuine raw materials on reasonable rates;

(2) money to purchase them ; and

(3) a ready market for sale of their manufactured goods.

In addition to these, if they are also given facilities to improve the manufacture and to increase the outturn, by means of improved appliances, so as to stand against commercial competition, that is all what the weavers desire for. Although every assistance was being rendered by me to the weavers especially, in order to relieve them from their difficulties, my onerous tasks have been much lessened by the interference of the Co-operative Department which actually has done a real boon to them. The organization of co-operative weavers' and reelers' societies are still in rapid progress and under it, the weavers are being made to feel their responsibilities. Through the medium of their respective societies, their demands are all being supplied with. Besides, ample facilities are being given to them, to improve their method of manufacture by my suitable demonstrations and timely visits. As far as my demonstrations are concerned, they are not conducted at random and for demonstration's sake. The weavers are fully consulted with their requirements before any demonstration is held. The demonstration and introduction of costly looms or accessories are generally attempted, if the parties take interest in them and are anxious to have them. Revolutionary innovations other than improving the existing methods are not welcome among the weavers or reelers, and they take recourse to the former, only if it satisfies all the conditions. If the weavers happen to be utterly reluctant towards improvements or to be too poor to adopt them, every attempt is made to improve their own loom by the adjustment of improved appliances and accessories, that would go to show a perceptible increase in outturn, etc.

To give full effect to the measures above alluded to, and to popularize the object of my mission, I visited the following places in the Province and attended to works as detailed below :—

1. Faridpur, Madaripore, Gopalganj, Rajbari, Bhanga, Nurpur, Najirpur, Paschim Sadardhi are the principal centres visited by me in the district of Faridpur, to induce the weavers the advantages of adopting fly-shuttle appliances by practical demonstrations. I demonstrated at the Exhibition held at Faridpur the working of automatic looms, fly-shuttle looms and other hand-looms, side by side, to compare and contrast their working facilities. The weavers greatly appreciated such object lessons. I, further, demonstrated the working process of silk and tussar reeling to the benefit of those

who are interested in the affair. The Co-operative Weavers' Societies organized by me in Nurpur, Najirpur and Paschim Sadardhi have been given every assistance and instructions by timely visits, and made to enjoy the privileges of societies. Arrangements are being made to organize more societies in the above localities.

2. Nawabpore, Tattipara and Kaira are the weaving centres visited by me in Dacca district. The weavers' society at Kaira being an old society, it is being modified according to the new bye-laws and brought to a working state like the existing societies. It has been also arranged to organize weavers' societies at Nawabpore, where I conducted my weaving demonstrations, etc., and fully induced the weavers to organize one. At the request of Nawabpore and Tattipara weavers, I gave them necessary practical help to improve the weaving of border designs and arranged to get them Japanese Dobbies to work with. Further, every assistamce is being rendered to improve their method of manufacture and to dispose of their manufactured articles.

3. Ruhi, Heluchia, Aurangabad, in the Subdivision of Netrakona, Bajitpur in Tangail and Kisorgunge are the centres in the district of Mymensingh visited by me. The Co-operative Weavers' Society at Bajitpur in Tangail is in a working state and every assistance is being rendered to facilitate their method of working. To induce the weavers of other places in the district to adopt improved appliances, I demonstrated such of them as fully suited their local circumstances and rendered them every timely help. The difficulty they suffered from the scarcity of proper raw materials was also being mitigated by their supply from Calcutta.

4. Barisal, Madabpasha, Kashipore and Mangalhat are the principal places visited by me in the district of Bakarganj. I demonstrated improved fly-shuttle and other appliances at the request of local weavers and they are being benefited by such demonstrations and have begun to adopt improved accessories. Further, necessary arrangements have been made to dispose of their manufactured articles in Calcutta and to send them back in turn the required raw materials.

5. Nuthen Bharenga, Bagchor, Eadarukpore Tantibund, Tarabaria, Gangarampur, and Sibpur are the principal weaving centres visited by me in the district of Pabna. The Bharenga Weavers' Society is almost in a liquidated state, as the village has been washed away and its members have been scattered to different places. It has been arranged to organize a new society at Nuthen Bharenga so as to include weavers residing at Eadarukpore, Bagchor, and the neighbouring villages. I visited the above villages to induce them and to improve their manufacturing processes, by introduction of improved appliances. At Tantibund, a weaving factory is started at the influence of a local Zamindar, in order to teach the local weavers the improved methods and to find labour for those who are too poor to work at home. The factory is rendered every help in carrying out its mission. At Tarabaria the Co-operative Society organized by me is being brought to a working state. In the other places mentioned above, fly-shuttle looms have been demonstrated to their benefit and a supply of improved accessories has been arranged at present at the request of weavers.

6. Shujapur, Gayazabari, English Bazar, Perozpur, Kaliachuck and Chowdala are the principal reeling centres in Maldah, visited by me. In all the above places the reelers have been fully induced to improve their method of reeling by reeling demonstrations and timely instructions. They appreciated those instructions by following them as far as they could, and my frequent visits to those reeling centres were very benefical to the reelers, who had adopted those improvements. At Sibgange in the district of Malda the silk-weavers have finally adopted my improvements on selvage borders for dhoties and saries and those improved accessories for weaving are being very much appreciated.

7. In the Industrial and Agricultural Exhibition held at Rangpore, I demonstrated the working of Salvation Army Loom and an improved silk-reeling machine to the benefit of the weavers, if any visited. Although the district was noted for its dhurries, the industry, at present, is almost extinct and the weavers have taken up jute cultivation. Hence, very few weavers took interest in my demonstrations.

8. I visited Darjeeling, as desired by the Secretaries to the Bhutia Association and the Buddhist's mission to make arrangements to sell profitably a large stock of "Bhutia Chadar" that could not find a market. They have been sold partly in the plains and partly in Calcutta. In consultation with the Registrar of Co-operative Societies, a meeting of all the Bhutia

settlers who are weavers, was held and they have been fully explained all advantages of Co-operative Societies and it was finally proposed to organize a co-operative weavers' society amongst them; and they even submitted a requistion to the Registrar for registration. The demonstration of weaving, etc., could not be conducted hitherto, for want of suitable accommodation and arrangements on their part. As every arrangement has been done at present, they are being supplied with special raw materials (yarns, etc.) and looms for weaving and tape-weaving on their request.

9. I conducted demonstrations of fly-shuttle looms in Bolkali, Dholghat, and Tattipara in the district of Chittagong and rendered the weavers every assistance to improve their method of manufacture The weavers manufacture gamchas and lungees and dhoties, etc., with coarse counts of yarn for which they find a market locally for the present.

10. Azisfazilpur and Purva Chandrapur are the centres visited by me in the district of Noakhali. I found that the demonstrations conducted by me on a former occasion had done some good to the weavers. Further, I gave them necessary instructions and practical help to improve their method of manufacture.

11. The weavers of Comilla, Manamathi, Ghoshnagar, Ballasher and Jafrabad, in the district of Tipperah, have already been rendered both practical help and facilities to study improved methods of weaving by means of demonstrations of looms that were quite suitable to their requirements and means. Fast coloured yarns and improved weaving accessories have been supplied to them through an agent at Calcutta to help the progress of manufacture.

12. Beldanga, Soampara, are the silk-reeling centres; Berhampore, Baluchar and Kagra are the weaving centres; Gopalnagar and Kalkadidar are centres for wool manufacture in the district of Murshidabad. The filature reelers of Soampara and Beldanga were consulted as to further measures to be adopted to improve reeling and in reply, they said, that the presence of an advantageous market was the thing wanting and when it could be had, neatness and accuracy would follow itself. It is the absence of a good market that makes the reelers to reel their thread at random. I visited Gopalnagar and Kalkadidar to improve their method of blanket-weaving. Fly-shuttle looms and other preparatory appliances are being prepared to facilitate labour and cost of outturn.

13. I visited Ghatal, Ramjibanpur and Daspur in the district of Midnapur and inspected the working of wool-weavers and gave them practical demonstrations to improve the method of scouring and spinning wool, and to prevent it from insect-bites. To adopt improved fly-shuttle looms, etc., they expressed their inability and shortage of funds. They have been moved to consult among themselves about the organization of a weavers' society similar to that of Gopalnagar.

14. I visited the weaving school at Bankura and found it greatly assisting the local weavers in every respect. The famine relief committee also has rendered useful help to the weavers. It was actually found that some of the weavers who possessed fly-shuttle looms could earn more money in the shape of wages than the hand-loom weavers. I therefore suggested to the president to advance fly-shuttle looms to the hand-loom weavers also. The matter has been postponed for want of funds. I visited Bishnupur to inspect the working of silk-weavers and arranged to supply them with improved weaving accessories, for which alone they stood in need of at present. Owing to the scarcity of *tussar* cocoons this year, the progress of *tussar* weaving was in a retarded state.

15. I visited Serampore Weaving Institute as desired by its Principal to consult with him measures to be adopted in improving reeling methods in silk centres. The matter is under due consideration. The Tribeni School had to stop its work temporarily, as its master in charge and his assistants got attack of malaria and fled away. As the place was found to be very malarious, much difficulty was experienced to entertain suitable workmen. Further, sufficient funds were not available to purchase the required raw materials. Therefore, its Secretary had to postpone its working until further notice.

16. Kharida, Birsingpur, Bandirbon, Katanga, Raipur, Abadanga, and Sukhbazar are villages in the district of Birbhum, where co-operative weavers' societies have already been organized and whose works are being conducted under my supervision. To the weavers of Birsingpur, Bandirbon and Katanga, the working of fly-shuttle loom was quite unknown and with all efforts I introduced its working among them and taught a few weavers

also its method of working. The work is in progress and the loom is also being popularized. These looms were manufactured at Abadanga by a local carpenter for Rs. 7-8 each and supplied to the above societies. At *Tattipara* also, the weavers are being rendered every possible help towards improving their industry. At *Suri*, during the Industrial and Agricultural Exhibition, demonstration of improved fly-shuttle looms, automatic looms and ordinary pit-looms was held side by side to convince the weavers of their comparative merits. Besides, silk and *tussar* reeling by means of improved reeling machines was also successfully conducted to the full appreciation of the reelers and weavers who assembled there. The weavers were fully convinced of the facilities of having improved accessories by practical demonstrations and my earnest endeavours on that occasion fully induced the weavers, etc., to adopt improved methods of weaving, and as a result of this, I have received orders from weavers to supply 26 fly-shuttle looms and their accessories. The carpenter at Abadanga is busy with the work of supplying them according to the requirements.

I beg to state in conclusion that every possible impetus is being given to the weaving industry, in general, towards its revival and improvement, visiting almost all the abovementioned centres, as far as time and opportunity could permit. During the year much attention was paid to the improvement of existing manufacturing conditions which prevailed under the organized weavers' societies by my frequent visits and timely assistance. The demonstration of improved appliances and accessories that suited the weavers' requirements and means have fully induced the weavers to form more societies and to enjoy the benefits of such organization.

N. N. PILLAI,
Weaving Master.

B. S. Press—14-12-1917—1261J—250—A. G. R. and others.

ANNUAL REPORTS

OF

EXPERT OFFICERS

OF THE

DEPARTMENT OF AGRICULTURE, BENGAL,

FOR THE YEAR

1917-18.

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BENGAL SECRETARIAT BOOK DEPOT.

1918.

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ANNUAL REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, WESTERN CIRCLE, FOR THE YEAR 1917-18.

Charge.

1. I was in charge of the Western Circle throughout the year. During the period under review I supervised the work at the Chiusurah, Burdwan and Kalimpong farms, controlled the demonstration work in the Burdwan and Presidency Divisions, arranged a set of exhibits for the Food Products Exhibition, organized departmental exhibits at agricultural exhibitions in these two divisions, supervised the two divisional seed stores, attended meetings of Agricultural Associations and helped to check jute areas in Western Bengal. I visited Sonepur to purchase cattle and attended the meeting of the Board of Agriculture at Poona.

Tours.

2. During the period 1st July to 31st March, I was on tour 123 days, and spent the following periods in the various districts noted below :—

Hooghly	... 19 days.		Nadia	... 12 days	
Burdwan	... 18	,,	Murshidabad	... 3	,,
Birbhum	... 10	,,	Jessore	... 4	,,
Bankura	... 7	,,	Midnapore	... 4	,,
24-Parganas	... 4	,,	Khulna	... 3	,,
Darjeeling	... 12	,,	Sonepur	... 4	,,
Dacca	... 6	,,	Poona	... 12	,,
Howrah	... 4	,,	Rampur Boalia	... 1 day.	

Most of my time was taken up with the farms at Chinsurah, Burdwan and Kalimpong and with demonstration work in districts where District Agricultural Officers are maintained by this Department, viz., Birbhum, Bankura, Midnapore and 24-Parganas.

Very successful work has been accomplished in these four districts where the District Magistrates, Messrs. G. S. Dutt, J. Vas, A. Marr, and W. D. R. Prentice, took a personal interest in our work. I take this opportunity of recording thanks for all the help received from these gentlemen during the year. Mr. S. C. Mukherji, District Magistrate of Hooghly, and both Mr. W. S. Adie, District Magistrate, and the Hon'ble Sir Manindra Chandra Nandy, Maharaja of Kasimbazar, supported our work very strongly at the Chinsurah and Banjetia Agricultural Exhibitions, respectively. I was able to use the Farm Superintendent of Burdwan to a certain extent on district work in the Burdwan district with very satisfactory results, and was very strongly supported by Mr. P. H. Waddell, Dr. S. K. Sen of Burdwan town and Mr. N. C. Sircar. The need for District Agricultural Officers in Burdwan, Hooghly and Murshidabad is very urgent. The people are continually asking for advice and inspection.

Staff.

3. My staff during the period under review comprised two Superintendents of Agriculture, three Farm Superintendents, four District Agricultural Officers, three Farm Overseers and 13 Demonstrators, while 32 temporary jute clerks were employed from May to September on the jute forecast work.

District Work.

4. Demonstration work in the districts is limited by the district staff. Only four districts have Agricultural Officers, so district work may be said to have been limited to those four districts. The remaining districts of Burdwan, Hooghly, Howrah, Nadia, Murshidabad, Jessore, Khulna and Darjeeling not having Agricultural Officers only took an academical interest in our work, but the way is prepared. An Agricultural Officer in a very short time would have an active body of workers to support him in each one of these districts. One extra District Agricultural Officer was appointed during the year, and placed in charge of Midnapore. The results obtained already justify this appointment.

There are many agricultural improvements to bring to the notice of cultivators as the result of our farm work, and as each district has an Agricultural Association the District Officer is assured of local support from the day of his appointment. These associations have perhaps not been as useful as we wished, but this was on account of the requisite guidance and supervision of their work. Given a District Agricultural Officer each association will become a live organisation within a very short time. There are already in each district a few earnest workers which can easily be added to.

I hope each district will shortly be provided with a District Agricultural Officer.

Details of district work are given below :—

Items of demonstration.—1st—Bonemeal as a manure for paddy has passed the demonstration stage in Birbhum. It is now becoming very popular. This same manure is being demonstrated in Burdwan, Bankura and Midnapore. We had 1,500 bighas under observation in the Burdwan Division in 1917. The quantity applied is 1 maund per bigha and the increased yield is 2—4 maunds per bigha.

2nd—Groundnuts as a crop are being also demonstrated in the above districts on high land, where water scarcity for paddy is most felt. We commenced work on this crop in 1915, and in 1917 in the Burdwan Division had 1,508 bighas under observation. The average outturn is 6 to 8 maunds per bigha.

3rd—Dhaincha greenmanure for paddy.—Results obtained everywhere are very satisfactory. The demonstration of this item alone justifies the appointment of a District Agricultural Officer for every district. We had 1,000 bighas under demonstration in the Burdwan Division alone. The increased yield is 6—10 maunds per acre.

4th—Castorcake as a manure is becoming very popular in the 24-Parganas for most crops. The export of this valuable manure constitutes a very grave state of affairs. We ought to demonstrate its value more.

5th—(A) Improved paddy seed.—Where tried, Dacca No. 1 paddy has given good results. It is a good variety. During the year Hooghly No. 1 paddy (Improved Nagra) gave an average increased yield of $5\frac{1}{4}$ maunds of grain per acre over Dacca No. 1 at the Chinsura farm on approximately 50 acres. The theoretical tests do not agree with these results, so further comparisons between Indrasail and Nagra will be made.

We cannot expect either Dacca No. 1 or Hooghly No. 1 paddy to be suitable for the larger area of paddy land in Burdwan, Birbhum, Bankura and Midnapore districts and Kandi subdivision of Murshidabad, but for small areas below tanks or bunds that have an assured water-supply right up to December these varieties may suit. In the larger areas where the growing period of rice is one month shorter than in the latter, an earlier ripening variety is required.

(*B*) *Jute seed*—The Fibre Expert, Mr. R. S. Finlow, thinks we have at last obtained an *Olitorius* variety of jute suited to the Desi districts that we can recommend for Western Bengal. This will be tried extensively in 1918.

(*C*) *Improved cane.*—Thick canes are now appreciated in many places. Our present supply is not equal to the demand.

The tabulated statements below give an idea, district by district, of the work of the District Agricultural Officers during the year.

Weather.

5. The year 1917 was a bumper one for agriculture in Western Bengal Observers of long experience say they have not seen such crops for 20 years This cannot be accounted for by any abnormal increased use of seed manures and implements on the part of cultivators, and can only be explained by the long continued rainy season. The result has been that the price of paddy has dropped in places to Re. 1-8 per maund, a price that is also almost prehistoric so far as the present generation is concerned. This lowness of price has been helped, no doubt, by the want of railway wagons for removing the crop.

This bumper year explains one fact that was somewhat obscure to me, viz., why it was that large areas of land have not become worn out in Western Bengal? This land always grows paddy year after year and receives little or no manure. The explanation is that the rainfall in many years does not allow a crop to make use even of the plant food that has been prepared in the soil in the ordinary manner during the year. Accordingly it only requires a few scanty seasons to allow plant food to accumulate in the soil when, if a favourable long monsoon sets in, the crops can be double of those of preceding years. This is what happens, and a glance at all our experimental results in Western Bengal for the past 20 years shows time and again instances where the crop of one year is even 100 per cent. better than those of another year.

Farms.—Good work was done at each of the farms as will be gathered from the reports below.

Seed stores.—The two stores at Sealdah and Howrah are filling a great want and are becoming popular. The work has increased to such an extent that Superintendents of Agriculture are overworked and we have had to think of decentralising the work and removing district work to the headquarters of districts. This is the practical solution of the difficulty, and will be a simple matter when each district is provided with a District Agricultural Officer and seed store.

Mr. J. N. Sirkar, Superintendent of Agriculture, Burdwan Division, was particularly busy at the Howrah seed store as will be seen from the following list of seeds and manures distributed during the year :—

Seeds.	Mds.		
Dhaincha seed ..	60	Improved cane cuttings	53,000 Nos.
Groundnut seed ...	64	Miscellaneous ...	113 Mds.
Paddy chiefly Indrasail ...	44½		

The quantity of dhaincha and groundnut does not represent the actual work done by the Superintendents, as large quantities of both were purchased locally and employed.

In addition to the above 100 maunds of Hooghly No. 1 paddy have been distributed this year for testing in the districts in 1918.

	lbs.	Mds.	Tons.
Manures—			
Bonemeal	... or	1,630	or 60
Castorcake	... „	268½	„ 10
Miscellaneous	... „	70	„ 2½

	No.
Implement	8

Mr. H. P. Mittra, Superintendent of Agriculture, Presidency Division, distributed from Sealdah seed store the following quantities :—

	Mds.		Mds.
Seeds—			
Indrasail paddy ...	67½	Dhaincha	17½
Other kinds of aman paddy	7⅞	Jute seed for 1917 ...	18
Kataktara aus paddy for work in 1918 ...	36	Jute seed for 1918 ...	12
Other kinds aus paddy ...	2	Potatoes—	
Groundnuts ...	9	Darjeeling	163
Rahar	1½	Nainital	25½
		Papya	...
		Sugarcane cuttings ...	22,259 Nos.
Manures—			Mds.
Castorcake	464½ 17 tons	Sulphate of ammonia ...	8
Bonemeal	30½	Sulphate of potash ...	3¾
Superphosphate ...	9¾		
Implement		... 1 Don.	

With only one District Agricultural Officer to help him this made the Superintendent of Agriculture very busy. When more District Agricultural Officers are provided the demand will be much greater.

Farms—

A. Chinsurah.
B. Burdwan.
C. Kalimpong.

A. *Chinsurah.*—The chief work during the year was the production of selected paddy seed for distribution throughout the Province. Both Indrasail (Dacca No. 1) and Nagra (Hooghly No. 1) were grown, and 2,000 maunds of seed have been despatched to various centres for demonstration in 1918.

A block of land was tested for uniformity for the purpose of obtaining standardised plots.

Seed selection of both paddy and jute were carried out under the instructions of Messrs. Hector, Economic Botanist and, Finlow, Fibre Expert.

The usual manurial experiments were carried out, and dhaincha green-manure for paddy further demonstrated its efficacy.

There are now many improvements that we can definitely recommend to the cultivator as the result of our work on this farm, and it only remains for a District Agricultural Officer to be appointed to carry out the necessary demonstrations in the district.

B. *Burdwan.*—Good work was done at this farm on paddy, jute, sugarcane and groundnuts during the year, and we only await the appointment of a District Agricultural Officer to this district to make bonemeal, groundnuts, dhaincha, sugarcane and potatoes as popular as they are becoming in the Birbhum district.

C. *Kalimpong.*—The good work of seed selection of maize was continued, and vegetable cultivation was taken up on a large scale. The way is ready for the appointment of a District Agricultural Officer to demonstrate the definite improvements obtained at this farm amongst the cultivators on these hills.

District Demonstration work, Agricultural Association activity and District Agricultural Officers all depend upon one another. This is exemplified in the following tabulated results of the districts. Where there is no District Agricultural Officer, there is little to report.

BURDWAN DIVISION.

Birbhoom.

A. Bonemeal on aman paddy.
B. Groundnuts.
C. Dhaincha green manure.

AMAN PADDY.

BONEMEAL MANURING.

The following results have been obtained in 1917 from nearly 1,000 bighas, under the supervision of the District Agricultural Officer, Birbhum, Babu Jogesh Chandra Roy, and controlled by Mr. J. N. Sirkar, Superintendent of Agriculture, Burdwan Division. The plots represent one from each centre. Bonemeal applied at the rate of 30 seers to 1 maund per bigha :—

BIRBHUM, 1917.

Serial No.	NAME.	RESIDENCE.		Area in bigha.	Rate of bone-meal per bigha.	OUTTURN OF PADDY PER BIGHA.			Increase due to bonemeal per bigha.	Value of bone-meal per bigha.
		Thana.	Village.			Without manure.	Cow-dung.	Bone-meal.		
					Seers.	Mds.	Mds.	Mds.	Mds.	Rs. A.
1	Munshi Mahamad Sagar	Maureswar ...	Saddyahat ...	100	30	7	10	11	4	2 4
2	Sayed Fusat Ali	Muraroal ...	Dumurgram	36	30	6	8½	10	4	2 4
3	Khan Bahadur Shams-uz-Zoha ...	Maureswar ...	Sakadda ...	60	40	7½	9	10½	3	2 4
4	Babu Annoda Prosad Mukherjee ...	Rampurhat ...	Akhiria ...	36	30	3	7	8	5	2 4
5	Rai Bahadur Abinash Chandra Banerjee.	Amodpur ...	Sultanpur ...	40	40	7	10½	11	4	2 4
6	Babu Charu Chandra Sinha ...	Bolpur ...	Sehala ...	3	40	4	...	9½	5½	2 4
7	,, Kanti Chandra Sarkar ...	Do. ...	Surut ...	4	40	7½	...	10½	3	2 4
8	,, Charu Chandra Sarkar ...	Do. ...	Do. ...	4	40	7½	...	10½	3	2 4
9	,, Ashu Agambagis	Do. ...	Goalpara ...	8	15	7	...	9	2	2 4
10	,, Kali Das Chatterjee	Amodpur ...	Srinidhipur ...	3	40	8½	...	11½	3	2 4
11	Maulvi Said Abdul Huque	Nanoor ...	Papuri ...	15	40	8	...	10	2	2 4
12	Mati Suddi Mea	Do. ...	Do. ...	8	40	7	...	9	2	2 4
13	Ramaya Mea	Do. ...	Do. ...	16	20	6	...	7	1	2 4
14	Abujahar	Do. ...	Do. ...	3	40	6	...	10	4	2 4
15	Sheik Abdul Haque	Do. ...	Do. ...	3	40	7	...	9	2	2 4
16	Babu Baidyanath Roy	Do. ...	Bagpara ...	9	45	7	10	13	4	2 4
17	,, Anadi Kinkar Roy	Do. ...	Nanoor ...	20	40	4	6	7	3	2 4
18	Mahamad Hossain	Rampurhat ...	Binodepur ...	100	40	6	8	9	3	2 4
19	M. Baharzan Mia	Ditto ...	Pakuria ...	10	30	6	8	11	5	2 4

For particulars please apply to—

(i) District Agricultural Officer, Birbhum, Suri.
(ii) Agricultural Demonstrator, Bolpur.
(iii) Ditto ditto Rampurhat.

GROUNDNUTS, 1917.

(*Chinabadam.*)

The following results have been obtained in 1917, from 1,000 bighas, grown by 200 cultivators, under the supervision of the District Agricultural Officer, Babu J. C. Roy, and Superintendent of Agriculture, Mr. J. N. Sirkar. These plots represent one from each centre :—

BIRBHUM, 1917.

Serial No.	Name.	Residence.	Area under cultivation in bighas.	Cost of cultivation per bigha—Rs. 12 to Rs. 15. (Particulars).	Yield per bigha in maunds.	Value per maund.	Value per bigha.
					Mds.	Rs.	Rs. A.
1	Bagal Mistri	Koodeah (Suri) ...	½ bigha		12	10	120* 0
2	Babu Nabagopal Mitter	Katunia (Mahamad-bazar).	½ ,,		8	6	48 0
3	,, Rakal Chandra Chowdhuri	Angargoria	1½ bighas	Three ploughings and ladderings at the break of monsoon.	7	6	42 0
4	Hari Mea	Barasal	3 ,,		11	6	66 0
5	Abdur Rahim	Mollai (Mahamad-bazar).	3 ,,		9	6	54 0
6	Babu Banku Bihari Sadhu ...	Lambadarpur	2 ,,	Sowing with a plough; and laddering in June, July or August.	6	6	36 0
7	,, Santosh Chandra Mazumdar.	Santiniketan (Bolpore)	20 ,,		6	6	120 0
8	Dr. Charu Chandra Sinha ...	Bolpore	1½ ,,	Two hoeing and weeding.	8	6	48 0
9	Babu Gobinda Chandra Das ...	Ditto	7 ,,		5	6	30† 0
10	,, Nagendra Nath Naik ...	Ditto	6 ,,	Harvesting—8 males and 32 females or boys, in November to December.	5	6	30 0
11	,, Bhupati Nath Naik ...	Ditto	1 bigha		6	6	36 0
12	,, Sailesh Chandra Banerjee	Labpore	6 bighas		6½	6	39 0
13	,, Kali Das Banerjee	Ditto	5 ,,		7½	6	45 0
14	,, Girish Chandra Banerjee ...	Ahamadpur	6 ,,	Seed rate—8 seers per bigha.	7½	6	45 0
15	,, Ramapati Bhut	Isarpur	4 ,,		6¼	6	37 8
16	Mahamad Abdul Ganni	Maigram (Rampurhat)	2 ,,	Soil—high sandy soil, a waste land in Birbhum.	8	6	48 0
17	Munshi Abu Sayad	Ditto	1 bigha		10	6	40 0
18	,, Abu Mahomed	Ditto	1 ,,		10½	6	63 0
19	Babu Satish Chandra Chatterjee	Mollarpur	5 bighas		4	6	24 0
20	,, Sashi Bhusan Chatterjee ...	Dubrajpur	10 ,,		6	6	36 0

* Sold locally at As. 4 per seer.
† Water logged.

For particulars please apply to—

(I) District Agricultural Officer, Birbhum, Suri.
(II) Agricultural Demonstrator, Bolpore.
(III) Ditto ditto Rampurhat.

AMAN PADDY.

DHAINCHA GREEN MANURING.

To manure 1 bigha of land, cost only As. 6, *i.e.*, application of Dhaincha seeds at the rate of 2½ seers per bigha. The following results have been obtained from 500 bighas of land under the supervision of the District Agricultural Officer, Birbhum, Babu J. C. Roy, and controlled by the Superintendent of Agriculture, Burdwan Division, Mr. J. N. Sirkar. These results represent one from each centre :—

BIRBHUM, 1917.

Serial No.	NAME.	RESIDENCE.		Area in bigha.	OUTTURN OF PADDY PER BIGHA.		Increase of outturn due to Dhaincha green manuring per bigha.	Value of Dhaincha seeds—2½ seers per bigha.
		Village.	Thana.		Dhaincha.	Cowdung.		
				Bighas.	Mds.	Mds.	Mds.	Ans.
1	Babu Achinta Ganguli	Indragacha	Suri ...	15	7	4½	3½	5
2	„ Bhairab Chandra Banerjee.	Kondaipur	Do. ...	20	6½	5	1½	5
3	„ Ramanatu Naik	Bolpore ...	Bolpore ...	12	10	9	1	5
4	Munshi Mahamad Sagar	Saddyahat	Maureswar	16	8	6	2	5
5	Sayad Furat Ali ...	Dumurgram	Murarcai	5	9	6	3	5
6	Babu Annoda Prosad Mukerjee.	Akhira ...	Rampurhat	6	8	5	3	5
7	„ Souresh Ch. Sirkar	Kirnahar ...	Nanoor ...	13	10	9	1	...
8	„ Anadi Kinkar Ray	Nanoor ...	Do. ...	10	5	4	1	...
9	Dr. Charu Chandra Sinha.	Bolpore ...	Bolpore ...	25	6	4	2	...
10	Babu Ashu Agambagis	Goalpara ...	Do. ...	12	8	7	1	...
11	„ Kalidas Chatterjee.	Sreenidhipur	Amadpur	15	10	9½	½	...
12	„ Kanti B. Sarkar	Surul ...	Bolpore ...	4	7½	7½	Nil.	...

For particulars please apply to—

(i) District Agricultural Officer, Birbhum, Suri.
(ii) Agricultural Demonstrator, Bolpore.
(iii) Ditto, Rampurhat.

F. SMITH,

Deputy Director of Agriculture, Bengal.

Bankura.

A. Groundnuts.

Midnapore.

A. Groundnuts.

GROUNDNUTS.

(*CHINABADAM.*)

The following results have been obtained in 1917, under the supervision of the District Agricultural Officer, Mr. P. G. Krishnan, and Mr. J. N. Sirkar Superintendent of Agriculture, Burdwan Division, controlled by the Deputy Director of Agriculture, Bengal :—

BANKURA, 1917.

Serial No.	Name.	Village.	Thana.	Area in bigha.	Outturn per bigha.
				Bighas.	Mds.
1	Babu Nilambar Mukerjee ...	Malatikunja ...	Bankura ...	1	10
2	„ Trailokya Nath Kundu ...	Upersole ...	Do. ...	2	12
3	„ Kailas Chandra Mondal ...	Kalajhiria ...	Do. ...	2	12
4	„ Kedar Nath Dey ...	Rajarbagan ...	Do. ...	2	8
5	„ Debendra Nath Samanta	Chatrakanali ...	Do. ...	1	7½

Serial No.	Name.	Village.	Thana.	Area in bighs.	Outturn per bigha.
				Bighas.	Mds.
6	Babu Bepin Behary Patra ...	Jamjhuri ...	Onda ...	3	...
7	,, Bon Behary Sen ...	Rathanpore-Pathlaboni	Do. ...	1	...
8	,, Kedar Nath Sidhanta ...	Ola	Do. ...	7	12
9	,, Srinath Samanta ...	Kotarpore ...	Do. ...	3	9
10	,, Amarendra Goswami ...	Gourbazar ...	Do. ...	1	13
11	,, Radha Gobinda Chatterjee	Nikunjapore ...	Do. ...	2	12
12	,, Jatindra Nath Bhuia and others.	Tatydanga, Bankta and adjoining villages.	Taldanga ...	12	14
13	Babu Jagabandhu Singh Chowdhury.	Chakbad ...	Simlapal ...	20	12
14	,, Balabhadra Singh ...	Suklabad ...	Do. ...	6	12
15	,, Ramkrishna Singh ...	Bhaduldoba ...	Do. ...	8	11
16	,, Nanda Lal Singh ...	Jamkuria ...	Do. ...	6	10
17	,, Jugal Krishna Singh ...	Do. ...	Do. ...	2	12
18	,, Pran Ballabh Singh ...	Bheliadia ...	Do ...	2	12
19	,, Upendra Nath Haldar ...	Sulka ...	Raipur ...	3	12
20	,, Dibakara Misra ...	Saranga ...	Do. ...	3	15
21	Mr. A. Davies	Do. (new village)	Do. ...	½	1
22	Babu Jatindra Nath Singh ...	Thibibedia ...	Gangajalghati ...	1	5
23	,, Mahabharat Thakur ...	Matiala ...	Ditto ...	2	14
24	,, Puran Chandra Singh ...	Kanyamari ...	Ditto ...	1	2
25	,, Rajaram Mitra ...	Rajarambad ...	Ditto ...	1	7
26	,, Mahadeb Chatterjee ...	Hatgram ...	Indpore ...	1	16
27	,, Rajaram Chatterjee ...	Do. ...	Do. ...	4½	10
28	,, Sitaram Mukerjee ...	Gopinathdihi ...	Chatna ...	1	6
29	,, Radha Ballav Singh Thakur.	Taljiria ...	Do. ...	4	9
30	,, Radha Ballav Singh Thakur.	Housibad ...	Do. ...	5	8
31	,, Atul Behary Set ...	Matia'a ...	Do. ...	1	7
32	,, Rajani Kanta Panja ...	Luharpada ...	Jayapore ...	4	...
33	,, Atul Chandra Kar ...	Gola ...	Vishnupore ...	12	8
34	Muhammad Abdul Khalaiq Akhunji	Biswaspara ...	Ditto ...	3	2

GROUNDNUTS.

MIDNAPORE, 1917.

The following results were obtained in 1917 by Babu B. Dutt, District Agricultural Officer, Midnapore, controlled by the Superintendent of Agriculture, Burdwan Division :—

Serial No.	Place of Demonstration.	Name of owner.	Area sown.	Outturn actual.	Outturn per bigha.	Cost of cultivation per bigha.	Net profit per bigha at Rs. 5 per maund.
				Mds.	Mds. sr.	Rs. A.	Rs. A.
1	Kurchiboni, thana Gopiballavpur.	Nayabasan Ward Estate.	3 bighas	25¼	8 17	15 0	27 0
2	Ramanandapur	Ditto ...	1½ ,,	12⅝	8 3	14 8	26 0
3	Ditto ...	Ramnarayan Sarangi	1 bigha	10	10 0	14 0	36 0
4	Narisole ...	Baikunta Sariya ...	½ ,,	6	12 0	22 0	38 0
5	Dharampore ...	Pitambar Pal ...	1 ,,	7	17 0	13 0	22 0
6	Ditto ...	Trailokya Pal ...	¼ ,,	2	8 0	15 0	25 0
7	Gidni ...	Mr. S. Bose ...	1 ,,	7⅜	7 15	9 12	27 0
8	Do. ...	Babu N. L. Chatterjee	6 kathas	2½	8 13	10 0	31 10
9	Do. ...	Gobordhan Das ...	1½ bighas	13	8 27	10 8	32 8
10	Do. ...	Ditto ...	12 kathas	9	15 0	16 10	58 0
11	Do. ...	Ditto ...	½ bigha	5½	11 0	15 8	39 8
12	Alampore (near Gidni).	Haribhusan Singha ...	1½ bighas	9¼	6 7	10 10	20 8
13	Palasbani ...	Khudiram Mahanta ...	1 bigha	7¾	7 30	12 8	26 4
14	Bharatpur ...	Hrishikesh Purkait ...	2 bighas	16¼	8 5	14 4	26 6
15	Jhiria ...	Jagannath Hota ...	1½ ,,	13	8 27	12 0	31 4
16	Contai ...	Khas Mahal ...	1 bigha	2¼	2 10	5 6	5 14
17	Alampur ...	Sripati Das ...	½ ,,	4	8 0	12 0	28 0
18	Bharatpur ...	Jogesnarain Hota ...	1 ,,	7	7 0	13 0	22 0
19	Ditto ...	Ramnarain Hota ...	1½ bighas	11½	7 27	13 0	25 0

POTATOES 1917-18.

The following results have been obtained in Midnapore.

Serial No.	Name of owners.	Place of demonstration.	Area sown.	Outturn per bigha.	Cost per bigha.	Profit per bigha.
				Mds.	Rs. A.	Rs. A.
1	Babu Chuni Lal Bag ...	Mahisadal ...	5 cottahs	80	58 12	101 4
2	„ Ganganarain Bera ...	Mahisadal police-station Village Gopalpur.	4 „	60	60 0	60 0
3	„ Gagendranath Bhuia	Andula, police-station Mahisadal.	4 „	60	86 4	33 12
4	„ Sridhar Chandra Adhikary.	Gopalpur police-station Mahisadal.	4 „	65	80 0	50 0
5	„ Tarak Chandra Panda	Ditto ...	4 „	60	46 14	73 12
6	„ Protap Chandra Mandal.	Bandibasan ...	4 „	55	62 8	47 8
7	M. Shaikh Haji ...	Nabalukhia ...	10 „	40	33 12	61 14
8	Babu Sitanath Mandal ...	Khamipur ...	4 „	60	80 0	40 0
9	„ Pramatha Nath Pal ...	Misnapur ...	1 bigha	52	45 0	59 0
10	Rai Bahadur K. C. Praharaj	Beleberia police station Gopibaliavpur.	1 „	50	46 6	53 10
11	Babu Pitimbar Pal ...	Dharampur ...	1 „	30	22 0	38 0
12	„ Sudhangsu M. Dutt ...	Nayabasan ...	4 cottahs	50	30 0	70 0
13	„ Pramatha Nath Khan	Samginj police-station Chandrakona.	5 „	50	34 0	66 0
14	„ Jaggarnath Hota ...	Jheria police-station Jhergram.	10 „	70	67 8	72 8
		Nainital Potato.				
1	Babu P. C. Chakravarty ...	Aliguri police-station Salbani.	1 bigha	80	54 8	105 8
2	„ Bejay Chandra Pal ...	Bhita police-station Kharagpur.	1 „	75	48 0	102 0

F. SMITH,

Deputy Director of Agriculture.
Western Circle.

PRESIDENCY DIVISION.

Demonstration work.—As there was only one District Agricultural Officer in this Division during the year, viz., in the 24-Parganas, there is little to report systematically outside this district. The following tables show what was carried out in 1917-18 :—

24-Parganas.

A. Castorcake on jute.
B. Castorcake on aus paddy.
C. Castorcake on aman paddy.
D. Dhaincha green manure on aman paddy.

CASTORCAKE ON JUTE.

24-PARGANAS 1917.

Results obtained in 1917 with two maunds of castorcake per bigha in 24-Parganas District by S. K. Dutt, B. Ag., District Agricultural Officer, and Mr. H. P. Mitra, Superintendent of Agriculture, controlled by the Deputy Director of Agriculture.

Serial No.	NAME.	Village.	Thana.	Subdivision.	Area of demonstration plot.	OUTTURN PER BIGHA.		Increase in outturn per bigha.
						Demonstration plot.	Check plot.	
					Bighas.	Mds.	Mds.	Mds.
1	Tarak Das Banerjee ...	Ghoshpore	Baduria ...	Basirhat ...	1	5¾	3¾	2
2	Jitendra Nath Bose ...	Jamalpore	Deganga ...	Baraset ...	1	7½	5	2¼
3	Arjun Chandra Biswas ...	Kampa ...	Naihati ...	Barrackpore	2	6	3¾	2¼
4	Raj Krishna Pan ...	Do. ...	Do. ...	Ditto ...	1	6	3½	2½
5	Satish Chandra Mazumdar	Bhawanipore	Basirhat ...	Basirhat ...	1	5¼	3	2¼
6	Mahim Gazi ...	Pifa ...	Ditto ...	Ditto ...	1	3¼	1½	1¾
7	Nilmoni Sardar ...	Harisankar-pur.	Magrahat ...	Diamond Harbour.	1	6¾	4¼	2½
8	Uddhab Sardar ...	Ditto ...	Ditto ...	Ditto ...	1	6¼	4	2¼
9	Mathur Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	5¾	3¼	2½
10	Jogeswar Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	5	3¼	1¾
11	Annada Ghosh ...	Ditto ...	Ditto ...	Ditto ...	½	6½	4	2½
12	Ishan Ghosh ...	Ditto ...	Ditto ...	Ditto ...	½	6	4	2
13	Kalachand Mandal ...	Ditto ...	Ditto ...	Ditto ...	½	6¼	4½	1¾
14	Preonath Saha ...	Arjunpore	Ditto ...	Ditto ...	½	6	4	2
15	Ismail Mandal ...	Ghoshpore	Baduria ...	Basirhat ...	1	6	4	2
16	Jnanendra Nath Chatterjee	Malangapara	Sarupnagar	Ditto ...	1½	6¼	4½	1¾
17	Meserali Mandal ...	Chandpore	Deganga ...	Baraset ...	1	7½	5¾	1¾
18	Iswar Moochi ...	Abjanagar	Ditto ...	Ditto ...	1	7¾	5¾	2

CASTORCAKE ON AUS PADDY.

24-PARGANAS, 1917.

Results obtained in 1917 with one maund of castorcake per bigha in 24-Parganas District by S. K. Dutt, B. Ag., District Agricultural Officer and Mr. H. P. Mitra, Superintendent of Agriculture, controlled by the Deputy Director of Agriculture.

Serial No.	NAME.	Village.	Thana.	Subdivision.	Area of demonstration plot.	OUTTURN PER BIGHA.		Increase in outturn per bigha.
						Demonstration plot.	Check plot.	
					Bigha.	Mds.	Mds.	Mds.
1	Kunja Behari Haldar ...	Madarpore	Naihati ...	Barrackpore	1	8	6	2
2	Arjun Chandra Biswas ...	Kampa ...	Do. ...	Ditto ...	1	7¾	5¾	2
3	Rajkristo Pan ...	Do. ...	Do. ...	Ditto ...	1	8	6	2
4	Rash Behari Ghosh ...	Bhowanipore	Basirhat ...	Basirhat ...	1	6½	5	1½
5	Mahim Gazi ...	Pifa ...	Ditto ...	Ditto ...	1	6½	5¼	1¼
6	Anadi Bhusan De ...	Dhalchita ...	Ditto ...	Ditto ...	1	10¼	7¼	3
7	Nilmani Sardar ...	Harisankar-pore.	Magrahat ...	Diamond Harbour.	1	10	8	2
8	Annada Ghosh ...	Ditto ...	Ditto ...	Ditto ...	1	10½	8¼	2¼
9	Uddhab Sardar ...	Ditto ...	Ditto ...	Ditto ...	½	10½	6½	4
10	Kalachand Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	9	6¾	2¼
11	Mathur Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	8½	6¼	2¼
12	Mohesh Ghosh ...	Ditto ...	Ditto ...	Ditto ...	1	10	8¼	1¾
13	Jogeswar Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	9	7	2
14	Preo Nath Saha ...	Arjoonpore	Ditto ...	Ditto ...	1	10	8	2
15	Jitendra Nath Bose ...	Jamalpore ...	Deganga ...	Baraset ...	1	9	6	3
16	Hajari Muchi ...	Abjanagar ...	Ditto ...	Ditto ...	1	9¼	7	2¼
17	Meserali Mandal ...	Chandpur ...	Ditto ...	Ditto ...	1	10	7½	2½
18	Jnanendra Nath Chatterji	Malangapara	Sarupnagar	Ditto ...	1	10	8	2
19	Surendra Nath Ghosh ...	Rajibpore ...	Habra ...	Ditto ...	1	7	5	2

CASTORCAKE ON AMAN PADDY.

24-PARGANAS, 1917.

Results obtained in 1917 with one maund of castorcake per bigha in 24-Parganas district by S. K. Dutt, B. Ag., District Agricultural Officer, and Mr. H. P. Mitra, Superintendent of Agriculture, controlled by the Deputy Director of Agriculture—.

Serial No.	Name.	Village.	Thana.	Subdivision.	Area of demonstration plot.	Outturn per bigha.		Increase outturn per bigha.
						Demonstration plot.	Check plot.	
					Bighas	Mds.	Mds.	Mds
1	Tarakdas Banerji ...	Ghoshpore...	Baduria ...	Basirhat ...	1	8½	5½	3
2	Surendra Nath Ghosh ...	Rajibpore ...	Habra ...	Barasat ...	3	12	8	4
3	Maulvi Velayet Ali ...	Benipore ...	Magrahat ...	Diamond Harbour.	1	7	4½	2½
4	Kunja Behari Haldar ...	Madarpore...	Naihati ...	Barrackpore	1	8¾	5½	3¼
5	Hari Gopal Dutt ...	Beejpore ...	Ditto ...	Ditto ...	4	8	5	3
6	Arjun Chandra Biswas ...	Kampa ...	Ditto ...	Ditto ...	1	9¼	6½	2
7	Rajkristo Pan ...	Do. ...	Ditto ...	Ditto ...	1	9½	6½	3
8	Kabiruddin Mandal ...	Lakshmipur	Habra ...	Baraset ...	1	10	7	3
9	Tarak Chandra Ghosh ...	Ditto ...	Do. ...	Ditto ...	1	9	6½	2½
10	Jnanendra Nath Chatterji	Malangapara	Sarupnagar	Basirhat ...	2	8½	5½	3
11	Nilmoni Sardar ...	Harisankar-pore.	Magrahat ...	Diamond Harbour.	1	13	10	3
12	Ananda Ghosh ...	Ditto ...	Ditto ...	Ditto ...	1	13	9½	3½
13	Mathur Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	12½	9½	3
14	Mohesh Ghosh ...	Ditto ...	Ditto ...	Ditto ...	1	14	10½	3½
15	Ishan Ghosh ...	Ditto ...	Ditto ...	Ditto ...	1	12¾	9¼	3½
16	Kalachand Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	13½	10¼	3¼
17	Jogendra Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	12	8¾	3¼
18	Haripada Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	13½	9½	4
19	Makham Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	12½	9¼	3¼
20	Preo Nath Shaha ...	Arjoonpore	Ditto ...	Ditto ...	1	12	9	3
21	Satish Chandra Majumdar	Bhowanipore	Basirhat ...	Basirhat ...	1	11	8	3
22	Kedar Mondal ...	Pifa ...	Ditto ...	Ditto ...	1	12	8¾	3¼
23	Sukur Sardar ...	Nalcora ...	Ditto ...	Ditto ...	1	12	9¼	2¾
24	Abinash Chandra De ...	Prithiva ...	Habra ...	Baraset ...	8	9	6	3
25	Mati Lal Safur ...	Nangi ...	Budge Budge	Alipore ...	1	13	10	3

DHAINCHA GREEN MANURE ON AMAN PADDY.

24-PARGANAS, 1917.

Results obtained in 1917 in 24-Parganas district by S. K. Dutt, B. Ag., District Agricultural Officer, and Mr. H. P. Mitra, Superintendent of Agriculture controlled by the Deputy Director of Agriculture.

Serial No.	Name.	Village.	Thana.	Subdivision.	Area of Demonstration plot.	Outturn per bigha.		Increase in outturn per bighas.
						Demonstration plot.	Check plot.	
					Bigha.	Mds.	Mds.	Md
1	Nilmani Sardar ...	Harisankar-pore.	Magrahat ...	Diamond-Harbour.	1	11	10	1
2	Mathura Mohan Mandal	Ditto ...	Ditto ...	Ditto ...	1	10½	9½	1
3	Mohesh Ghosh ...	Ditto ...	Ditto ...	Ditto ...	1	12	10½	1½
4	Kalachand Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	11½	10¼	1¼
5	Jogendra Nath Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	10	8¾	1¼
6	Haripada Mandal ...	Ditto ...	Ditto ...	Ditto ...	1	11	9½	1½
7	Satish Chandra Majumdar	Bhowanipore	Basirhat ...	Basirhat ...	1	9¼	8	1¼
8	Kedar Chandra Mandal	Pifa ...	Ditto ...	Ditto ...	1	9¾	8¾	1

AGRICULTURAL SHOWS AND FAIRS, WESTERN CIRCLE, BENGAL.

Serial No.	Name of fair and locality.	Date on which the exhibition was held.	Amount contributed by the Agricultural Department.	Officers of the Department who attended and helped the agricultural shows.	Exhibits and demonstrations given by the Department.
			Rs. A. P.		
1	Food Products Exhibition, Town Hall, Calcutta.	3rd to 6th January 1918.	242 4 0	Deputy Director of Agriculture, Farm Superintendents, Kalimpong Burdwan and Chinsurah, Superintendents of Agriculture, District Agricultural Officers and Demonstrators and Deputy Director of Agriculture's Head Clerk Babu S. C. Chatterji.	Exhibits—Maps and charts. Seeds of agricultural food crops and agricultural and dairy food products.
2	Banjetia Exhibition, Berhampore, district Murshidabad.	15th to 20th March 1918.	Nil	Deputy Director of Agriculture Western Circle, Superintendent of Agriculture, Presidency Division, District Agricultural Officer, 24-Parganas' and Fieldmen Demonstrators— (1) Babu Karnadhar Ray. (2) „ S S. Bhattacharjee. (3) „ N. G. Mukherjee.	Exhibits— (*a*) Charts. (*b*) Seeds of all field crops, raiyats' seed and seeds improved by selection. (*c*) Manures—All sorts of organic and chemical manures commonly used and that can be introduced with special advantage. (*d*) Implements—Iron don, chain pump, Planet Junior hand hoe and Meston plough. Demonstrations were given about the use of the abovementioned implements. Lectures were given about the preservation of cattle dung, use of manures and special advantages of each one of them, effect of irrigation, importance of selected seeds, cultivation of thick varieties of sugarcane, potato, fodder crops, groundnut, arrowroot and improved method of agricultural operations such as washing of jute to improve the quality of fibre, sowing of rahar in lines with aus paddy to facilitate hoeing, etc.
3	Social Service Exhibition, University Institute Hall, Calcutta.	25th March to 3rd April 1918.	Nil	Deputy Director of Agriculture Superintendent of Agriculture, Presidency Division, Agricultural Officer, 24-Parganas, and Deputy Director of Agriculture's Head Clerk, Babu S. C. Chatterjee.	Exhibits— (*a*) Charts. (*b*) Groundnut, bonemeal, dhaincha castormeal. Lectures were given about the use of manures and advantages of selected seeds.
					DARJEELING DISTRICT.
4	Kurseong Flower and Vegetable Show.	1st April 1918 ...	Nil	Deputy Director of Agriculture and Head Clerk Babu S. C. Chatterjee.	Exhibits—Seeds, manures and implements recommended by the Department for Darjeeling. Charts and maps.

Serial No.	Name of fair and locality.	Date on which the exhibition was held.	Amount contributed by the Agricultural Department.	Officers of the Department who attended and helped the agricultural shows.	Exhibits and demonstrations given by the Department.
5	Margram, Birbhum.	25th to 29th December 1917.	Nil	Demonstrator, Rampurhat	Agricultural literature, namely, leaflets, pamphlets and charts were distributed and lectures on improved methods were delivered.
6	Nanoor, Birbhum.	25th to 27th February 1918.	Nil	District agricultural Officer, Birbhum, and Fieldman Demonstrator of Bolpur.	A small stall of departmental exhibits, specimens of seeds and manures with a few tools was arranged.
7	Raipur, „	12th March 1918.	Nil	Ditto	Ditto ditto.
8	Muraroi, „	18th to 23rd March 1918.	Nil	Superintendent of Agriculture Burdwan Division, and District Agricultural Officer, Birbhum.	Agricultural lectures were delivered and the Thana Agricultural Association was formed.
9	Hooghly ...	21st to 28th February 1918.	Nil	Deputy Director of Agriculture, Western Circle, Superintendent of Agriculture, Burdwan Division, Superintendent of Chinsura Farm, Overseers and Apprentices of the Chinsura Farmand Fieldman Demonstrator of Naihati.	A very big set of exhibits of seeds, manures, canes, gur, horticultural products, and tools and implements was arranged. Gur making, irrigation by double chain pump, winnowing, ploughing, etc., were practically demonstrated and lectures on improved agriculture specimen experienced in the farm were delivered by the Farm Superintendent. Superintendent of Agriculture delivered lectures with slides. Leafets, pamphlets and charts were distributed. The Deputy Director of Agriculture showed a good many interesting charts and maps giving various agricultural figures of India.
10	Suri, Birbhum ...	2nd to 7th February 1918.	Nil	Director of Agriculture, Deputy Drector of Agriculture, Western Circle, Superintendent of Agriculture, Burdwan Division, District Agricultural Officer, Birbhum, Superintendent of Burdwan Farm, Fieldmen Demonostrators of Bolpur and Rampurhat.	A big set of exhibits of agricultural seeds, manures and implements was arranged. Groundnut, potato and sugarcane were cultivated in the mela compound to show and explain the process of their cultivation. Gur making and extracting oil from groundnut, spading, hoeing, and irrigating by chain pump, preserving and storing seeds specially potato seeds and conserving cowdung were practically demonstrated. Lectures were delivered daily both theoretically and with slides. A garden of 125 varieties of paddy was artifically laid out. Leaflets, pamphlets and charts were distributed. Valuable maps and charrs with interesting figures of agricultural produce in various districts in Bengal were exhibited by the Deputy Director.

F. SMITH,

Deputy Director of Agriculture.

Western Circle, Bengal.

ANNUAL REPORT OF THE FIBRE EXPERT TO THE GOVERNMENT OF BENGAL FOR THE YEAR 1917-18.

Charge.

I have held charge of the Fibre Expert's and Agricultural Chemist's sections throughout the year under review. I was also in charge of the office of the Economic Botanist until the return from furlough of Mr. Hector in November 1917.

Tours.

Date.	Number of days.	Name of place.	Purpose.
9th to 30th April 1917.	22	Calcutta, Chinsurah and Baraset ...	To inspect jute plots and to attend officers' training class.
21st June 1917 ...	1	Godenail...	To inspect jute experimental plots.
5th to 15th August 1917.	11	Sarishabari, Serajganj, Elashin, Chandpur, Chaumuhani, Ashuganj, Niklidampara, Godenail, Narainganj, Mymensingh, Dhalla, etc.	Ditto ditto.
9th to 15th September 1917.	7	Calcutta, Baraset, Siliguri and Haldibari.	Ditto ditto.
16th to 22nd September 1917.	7	Calcutta, Baraset, Chinsurah and Rajshahi.	Ditto ditto.
26th September to 12th October 1917.	17	Godenail, Calcutta and Kumarikhatta	Ditto ditto.
14th October to 4th November 1917.	22 minus 7 days' casual leave.	Calcutta, Dalsinghsarai, Pusa, Muzaffarpur, Bettiah, Motipur, Dooriah, Ramgarhwa, Daulatpur, Chinsurah and Jalpaiguri.	To inspect seed jute producing area.
6th to 19th December 1917.	14	Poona	To attend Board of Agriculture.
6th November 1917	1	Godenail	To inspect jute experimental plots.
28th December 1917 to 5th January 1918.	9	Pusa	In connection with supply of seed jute.
19th and 20th January 1918.	2	Mymensingh	To inspect site of proprosed new farm.
20th to 28th February 1918.	9	Baihata, Kumarikhatta and Rajshahi	Inspection of jute and flax.
12th to 15th February 1918.	4	Calcutta and Chinsurah ...	Inspection of jute plots.
7th March 1918 ...	1	Godenail	Inspection of jute plots.
21st to 24th March 1918.	4	Calcutta and Chinsurah ...	Ditto.

One hundred and twenty-four days were spent on tour as detailed above. I also spent six days in camp with the I. D. F. at Dacca in February, and I attended two other training camps at Dacca in the months of May and June 1917.

Manures for jute on acid red soils.

Experimental work was confined to confirming the previous year's results in regard to the value of potash manuring for jute.

This subject arose out of the application of carbonates of potash and soda chiefly with the object of reinforcing the effect of lime. Later the investigation into water Hyacinth (*eichornia crassipes*) gave the work a further considerable impetus and focussed public attention on it.

In 1917 the same plots were used as in 1916, viz., South Hazi field and South Mirpur field. The early part of the season at Dacca was very unfortunate in that there was a prolonged draught of nearly five weeks between the end of April and the beginning of June. Practically none of the jute crop was sown before the last week of May, and as the monsoon began early there was no chance of anything better than a 50 per cent. crop. Nevertheless the differences in the yields of the manurial plots were almost as marked

as in the previous year, and provided ample confirmation of the results then obtained.

The figures are as follows :—

	Md. sr	Equivalent in lbs.
Average yield of plots receiving potash as salts of potash or as Hyacinth ash	7 12	598
Average yield of plot to which no potash was applied	3 33	313
Difference in favour of potash	3 19	285

Similar results were obtained in South Mirpur field, where jute was sown for the third year in succession, in order to investigate the inhibiting effect of potash manuring on the incidence of the root fungus Rhizoctonia.

The potash plots, besides being better grown, were practically free from disease, as the following figures show :—

PLOT TREATMENT.	Approximate number of diseased plants per acre.	YIELD OF FIBRE PER ACRE.	
		Md. sr.	Equivalent in lbs.
Carbonate of Soda (average of duplicates) ...	13,863	4 0	328
Check (average of duplicates) ...	12,261	3 0	246
Hyacinth ash equal to 200 lbs. potash per acre	1,301	8 20	697

Thus the interesting result was obtained that apart from producing a markedly larger crop of fibre—in this case more than double—the application of potash manure has been shewn to definitely inhibit attacks of Rhizoctonia in jute.

Other cases of fungus diseases being checked by manurial treatment are well known, the classic instance being the effect of liming on the " finger and toe " disease of turnips.

In collaboration with Dr. Butler, Imperial Mycologist, further work is being done on this subject, and suggestive observations have already been made regarding the fungus disease of rahar (*cajanus indicus*) known as 'pigeon pea wilt."

Experiments to determine the most efficient dose of potash for a jute crop.

In the present season (1918), a series of plots manured with quantities of water Hyacinth ash respectively equivalent to 100, 200 and 300 pounds of potash (K_2O) per acre in addition to a general manure equivalent to 50 lbs. of nitrogen has been sown with jute. The whole crop is doing well, and it is difficult at present to detect any difference between the effect of larger and smaller doses of potash. It has already been proved that 100 lbs. of potash (K_2O) produces a very satisfactory effect on a jute crop, and it remains to be seen if a heavier dressing would be economically sound.

Potash from ash of jute.

In view of the above observations regarding the effect of potash in the yield of jute fibre it is interesting to note that very marked differences in the potash content of jute plant ash have been found.

The red laterite (old alluvium) soils of Eastern Bengal contain about 0·3 per cent. of total potash (K_2O), whereas the silt soils of the new alluvium rarely contain less than 0·6 per cent., and some samples have been found with as much as 1·8 per cent. K_2O.

On the latter soils jute is sometimes grown for several years in succession and food crops are reaped ; but it is doubtful if jute could be grown oftener than two years out of five on the laterite without risk of loss from attack by Rhizoctonia.

The ash of jute produced on the laterite soils contains from 15 per cent. to 20 per cent. K_2O. On the other hand, the ash of plants grown on the silts usually contains about 40 per cent. K_2O, and occasional samples containing nearly 50 per cent. K_2O are met with.

The potash deficiency of the laterite grown jute is made up with lime and silica, and the increased silica content renders the retting of the plant much more difficult.

Bearing in mind the proved effect of potash manuring in increasing the yield of jute on laterite soils, it is not surprising to find a high potash content in jute grown on soils like the new alluvium which are rich in potash. It might also be expected that heavy application of potash manures to jute growing on the laterite would cause a markedly increased absorption of potash by the plant. This however is not at all certain, and evidence seems to indicate that the absorption of potash, at any rate by the jute plant, is capable under some conditions of being at least partially controlled by other factors. Interesting, if not valuable, results may be expected to accrue from work which is being carried out along these lines.

Experiments with green manure in Central Mirpur field.

In the last report (1916-17) a description was given of the results obtained from the Central Mirpur plots in the years 1915-16. In the season 1917 no lime was applied, but the lime and bone plots received 350 lbs. of bone-meal per acre. Green manure dhaincha (*Sesbania aculcata*) was again, as in 1915, grown on plots 1 to 4 and 13 to 16 inclusive. The remaining plots were sown with aus rice as a rotation crop. Details of the yields of the rice obtained may be rather out of place in this report, but they are included as shewing that the treatment the land has received in these experiments is suitable for other crops than jute. The yields of jute in 1915 are also included for the sake of completeness.

South Mirpur field. Non-green manured area, season 1917. Yields of Aus rice grown as rotation crop with jute.

LIME AND BONE.			NO LIME OR BONE.		
Plot No.	Yield per acre.		Plot No.	Yield per acre.	
	Jute in 1915.	Aus rice in 1917.		Jute in 1915.	Aus rise 1917.
	Md. sr.	Md. sr.		Md. sr.	Md. sr.
5 ...	19 4	14 19	6	1 2	2 37
7 ...	6 35	14 22	8	1 7	5 25
9 ...	22 25	21 36	10	13 7	9 24
11 ...	17 14	16 32	12	13 17	9 21
Mean ...	16 19	16 37	.....	7 8	6 37

	Jute. Md. sr.	Aus rice. Md. sr.
Difference due to application of lime and bone ...	9 11	10 0 per acre.

The manurial treatment of these plots has been as follows :—

	Lime.	Bone.	Total cost.
1915 ...	30 maunds (2,400 lbs).	3 maunds per acre	Less than Rs. 40.
1917 ...	.....	3 „ „	

In the meantime they have given aggregate increased yields of about 15 maund per acre of jute and 10 maunds per acre of rice. At Rs. 6 per maund

for jute and Rs. 2 per maund for rice, the total increased value of the produce is Rs. 110, while the total cost of the lime and bone is less than Rs. 40 (£2-10-8). Thus in three years and with prices of both jute and paddy lower than usual the aggregate increased net profit amounts to Rs. 70 (£4-13-4 sterling) per acre or an annual net profit of Rs. 23 (£1-10-8 sterling) per acre.

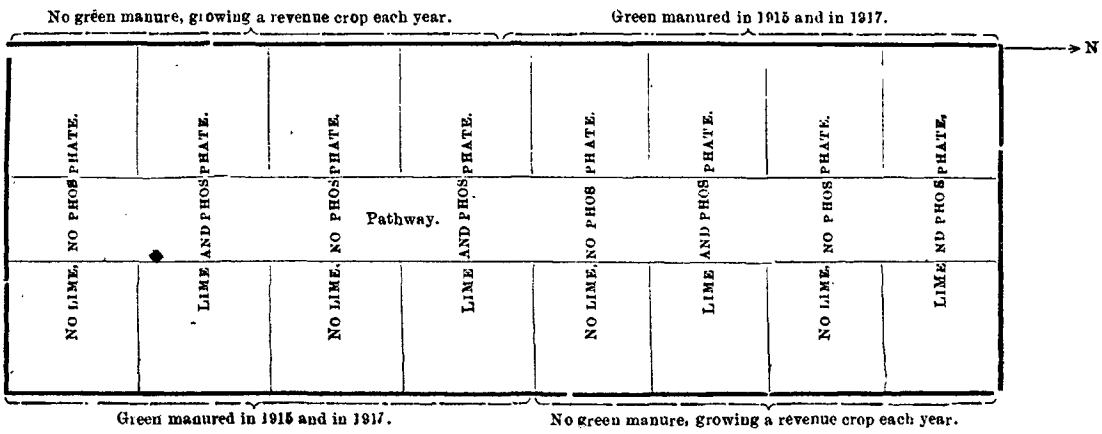
These results are almost identical with those obtained on a similar series of plots in East Shooti field several years ago. It is hardly necessary to point out how good an opening this offers for the extension of genuine co-operative credit. The raiyat who uses these manures will obtain an extra profit of Rs. 23 per acre from his land; but he can never afford the initial expenditure without the assistance of co-operative credit.

In the present season the whole of the Central Mirpur plots received a general manure including cowdung and castor cake equivalent to 50 lbs. nitrogen per acre, and as they were to be sown with jute, water hyacinth ash equivalent to 100 lbs. potash (K_2O) per acre was applied. In addition, the lime plots received a further dressing of 10 maunds (800 lbs.) per acre of slaked lime, making a total application of 40 maunds (3,200 lbs.) of lime since the commencement of this series in 1915—four years ago. Jute was sown on the 23rd April 1918; the crop on the limed plots, commencing with a very even germination, has made great progress and promises to be a very heavy one. On the unlimed land the germination was patchy, and at the time of writing, the plant has only made about one-third the growth of the crop on the limed plots.

The jute on the green manured plots is, so far as one can judge at present, no better than that on the land which bore a revenue crop (aus rice, see above) in 1917. It is of course too early yet to draw conclusions, but this is strictly in accord with all previous experience of green manure on the Dacca Farm.

A plan of the Central Mirpur plots is given below for the information of those who may be interested—

Central Mirpur plots, Dacca.


No green manure, growing a revenue crop each year.
Green manured in 1915 and in 1917.
N
NO LIME, NO PHOSPHATE.
LIME AND PHOSPHATE.
NO LIME, NO PHOSPHATE.
LIME AND PHOSPHATE.
Pathway.
NO LIME, NO PHOSPHATE.
LIME AND PHOSPHATE.
NO LIME, NO PHOSPHATE.
LIME AND PHOSPHATE.
Green manured in 1915 and in 1917.
No green manure, growing a revenue crop each year.

N. B.—(*a*) Diagonally opposite quarters of the series receive identical treatment, *i.e.*, green manure or no green manure as the case may be.

(*b*) Alternate strips receive lime and bone as shewn in the plan.

Seed Jute.

(*a*) *Corchorus Capsularis.*—In the year under review about 1,200 maunds (roughly 100,000 lbs. or 45 tons) of the seed of the pure line jute Kakya Bombai were produced. Messrs. Birkmyre Bros. grew about half this amount on their Assam estate, and we are indebted to Bihar planters for the remainder.

There is now a great demand for the seed of Kakya Bombai, which is appearing for sale in the local bazars, at enhanced prices as compared with local seed. The department has put up the price of the seed from Rs. 10 to

Rs. 12 per maund, as it was found difficult to cover expenses at the old price. In spite of this, and of the fact that the demand for seed was probably below normal, the whole of the above amount could have been sold without difficulty.

However about half the quantity of seed was employed in completing the Director of Agriculture's scheme of dissemination in the districts of Mymensingh and Dacca, and in extending it to Tippera, Faridpur, Pabna, Rangpur and Bogra. This scheme was highly successful last year : over 90 per cent. of the cultivators in the Dacca and Mymensingh districts who received seed kept their word, and there was seed for nearly 30,000 acres of Kakya Bombai in the Dacca and Mymensingh districts at the beginning of the present season. After the present year, if the scheme is equally successful elsewhere, the total yield of jute will begin to be appreciably affected.

In the present season about the same area of seed jute is being grown in Bihar and Assam, and it is hoped that a greater return of seed will be obtained. Last year the seed jute was attacked by a fungus—*Diplodia sp.*—and in some places the yield of seed was seriously reduced in consequence. The disease is common throughout the jute districts ; nevertheless, although specimens collected by myself, and others, as long as ten years ago, from places as far apart as Kissenganj and Mymensingh, were identified by the Imperial Mycologist, it is only when large areas of jute have been devoted to seed production—a new departure—that the fungus has been recognized as a definite parasite and not a saphrophyte. It is of course to be expected that new problems will appear as new practices are introduced. *Diplodia* only attacks the mature plant, *i.e.*, when the leaves begin to fall, and it is therefore not in the least likely to affect the fibre crop ; nevertheless all seed distributed by the department has, as a precaution, been sterilized in copper sulphate before despatch ; and the operation was found to be so simple that it has been decided in future to sterilize each year's seed supply.

We have been advised throughout in this matter by Dr. Butler, Imperial Mycologist, and by Dr. Shaw, Second Imperial Mycologist, and we are much indebted to them, especially for undertaking the treatment of the whole of the Bihar seed at Pusa.

(*b*) *Corchorus Olitorius.*—In 1917 a pure line of *Corchorus Olitorius R. 26* gave the best average yield, out of six pure lines, on very well grown plots at Rajshahi. In the present season a tentative distribution of about 12 maunds (1,000 lbs.) of the seed of this race is being made in Western Bengal including Rajshahi, and arrangements have been made for the raising of about 200 maunds (about 7 tons) of the seed for next year.

In the meantime variety tests are being continued at Rajshahi and Chinsurah, with the object of finally deciding whether R. 26 is to be taken as the best race which the department can produce.

The area of *Corchorus Olitorius* in the Desi districts and in Rajshahi is not so great as that of *Corchorus Capsularis*, and the distribution of the pure line seed of the former will not be such a big task as that of introducing Kakya Bombai into all the *Corchorus Capsularis* growing tracts.

Single plant cultures at Dacca.

At Dacca each year a large number of single plant cultures are grown. Some of these are Kakya Bombai, for subsequent multiplication, in order to keep a constant stream of pure seed flowing from Dacca to places where it is multiplied on a large scale, for distibution, or sale to jute growers.

Other cultures are from the seed of single plants, brought in or sent in from the districts, the object being to continually compare Kakya Bombai with other varieties so as, if possible, to find a better race than the former. So far this has not happened, but in view of the large area under jute it would be unwise to conclude that we have already got the best which is to be had.

A third kind of single plant cultures are artificially produced hybrids, the parents of which have been "crossed" with the object of combining in the offspring useful characteristics belonging to each parent.

The first hybrid jutes were produced as far back as 1910 by Mr. Burkill and the writer, but it is only in the last two years that time has allowed of

the resumption of the work. Some of the hybrids are promising and in any case this is a line of work which must be investigated ; but it still remains to be seen whether any practical result will accrue.

Last year's single plant cultutres were sown very late and in most respects the season was unfavourable, but in others it was a valuable one as it enabled the quickly growing races to establish themselves over slower growing ones. There are marked differences in this respect among races of jute, and last year's work enabled us to make some selections which may eventually prove to be of great importance.

At Dacca in recent years a great deal of chlorosis has been noticed among all the *Corchorous Capsularis* crops, and in 1916 it was decided to investigate the matter. Chlorosis is attributed to a number of different causes, including excess of lime. This could not be the case at Dacca ; moreover, single plant cultures, though apparently pure in every other respect, included both chlorotic and non-chlorotic plants. Examination of the respective root systems of chlorotic and non-chlorotic plants seems to indicate, that the former has a markedly longer tap root than the latter, and it is of course possible that the long tap root penetrates—as it might easily do at Dacca—into poisonous soil layers and thus cause chlorosis in the plant. At any rate the non-chlorotic plants, in pure cultures in 1917, were invariably decidedly more vigorous, and grew taller, to the extent of as much as 2 feet, than chlorotic plants.

The freedom from chlorosis, or the reverse, seems to be a hereditary factor ; but this is not quite certain, and it is in course of investigation.

It is necessary to remark, that while a shallow-rooted plant might be the best for the red soil tract, a deep-rooted plant might be more suitable under more favourable soil conditions.

Jute experiments at other places than Dacca.

Rangpur.—There was no variety trial last year at the Rangpur Dairy Farm ; but about 3 acres of land were laid out into plots which were tested by growing jute on them. The testing will be continued in the present year.

In the present season several pure lines of *Corchorous Olitorious* are being tested at the dairy farm, and one pure line of *Corchorous Olitorious* is being multiplied there.

At the Rangpur Demonstration Farm a variety test between Kakya Bombai and local Hewti resulted in a margin of 400 lbs. per acre in favour of the former.

Rajshahi.—In the year under review an important series of comparative tests between six pure lines of *Corchorous Olitorieus* was carried out. The results were sufficiently definite to exclude three races and the remainder are again being tested in the present year with three new ones.

The crop was a very fine one all through and, quite a considerable proportion of the plants reached 15 feet high. The best yield was obtained from R. 26, which gave 29 maunds 13 seers (2,405 lbs.) per acre of fibre. About 12 maunds (1,000 lbs.) of the seed of R. 26 have been have been tentatively distributed in Western Bengal, and arrangements have been made for the production of 200 maunds (16,000 lbs.) in the present season.

A potash manuriai series at Rajshahi has not yielded any definite results yet, probably because the only available site has twice, in recent years, been heavily manured for sugarcane. The experiment will be continued. There were signs in 1917 that Rhizoctonia was beginning to make headway *in the check plots.*

In addition to the above, 4·8 acres of seed jute were grown at Rajshahi *in 1917.*

Chinsurah.—At Chinsurah comparative tests between pure lines of *Corchorus Olitorius were also carried out ; of the 5* races tested three, including *R. 26, were the same as at Rajshahi ; the* remaining two were not grown *Rajshahi. The site of the plots* was inclined to be water-logged, and the op was only about half as good as at Rajshahi. The results were, therefore, t so reliable, but R. 27, a race which was not tried at Rajshahi in 1917,

was the best yielder, with 17 maunds 36 seer (1,468 lbs.) per acre of fibre. This race is included in both the Rajshahi and Chinsurah series in the present season.

In addition to the variety tests there were several acres of seed jute at Chinsurah in the year under review.

Experiments at mufassal jute agencies.

In the reports for the last two years an account has been given of experiments carried out in collaboration with Calcutta jute firms at their mufassal agencies. The results detailed in last year's (1917) report were of the greatest value to the Department, because no means of conducting reliable tests under responsible supervision, and on a wide scale, embracing practically the whole of the *Capsularis* growing districts, had hitherto been available; nor were such means likely to become available within a reasonable time. Although careful work done with Kakya Bombai at the Dacca Farm had indicated it as the best race of jute in our possession, it was far more satisfactory to have these results confirmed by a comprehensive series of tests such as the agencies furnished us with.

Therefore, even if no more useful results were to accrue from further work at jute agencies, the results already achieved would be ample justification for all the trouble and expense to which the respective firms and their local representatives have been put to.

In the season 1917 the tests were repeated at the whole of the agencies with the exception of Ashuganj, Bowreah and Rajshahi. Domar, in Northern Bengal, was included for the first time. The nature of the experiments at nearly all places was the same as in the previous years, *i.e.*, comparison of Dacca seed with the local jutes. The only modification was that the plots were interchanged, *i.e.*, land which grew Dacca seed in 1916 was sown with local jute in 1917 and *vice versa*.

In Northern Bengal, Mymensingh, Sarishabari and Serajganj, with thirteen tests all in favour of the Dacca seed, the result was almost uniformly two maunds an acre better than the local jute. At Saidpur 29 maunds per acre of fibre were reaped from Kakya Bombai. At Narainganj results were similar to the above on the Narainganj & Co.'s, and on Messrs. David & Co.'s, plots, and the same refers to Chandpur. At Elashin the Dacca seed was very markedly superior to the local jute, and yielded 34½ maunds per acre of fibre. At Chaumnhani, Nikli, and Chatalpara the results were against the Dacca seed, as the figures shew. The Chaumuhani result seemed quite definite, as the local crop was a very fine one and of a type not previously met with. Samples of the seed of this crop were obtained for further investigation at Dacca in the present season.

One of the most interesting experiments was that carried out at Messrs. Bird & Co.'s agency, Narainganj, by Mr. Ducat. The test between Dacca seed and Bidyasunder was on very low land, on the bank of the Luksha river, which goes under water almost as soon as the rivers begin to rise. Bidyasunder is a very early, and highly branched, red jute, which has the reputation of being the best race to sow under these conditions. Both crops were cut very early—about the first week of July when the river began to rise. At this time Bidyasunder was in flower; but the Kakya Bombai was not nearly at the flowering stage.

The test was very much in favour of the Dacca jute as, apart from a heavier yield, the Dacca fibre consisted practically of 2's and 3's quality as against 3's and 4's quality for the local jute.

This result is dealt with in some detail, because it has a very wide application in tracts like Mymensingh, Northern Bengal and Bihar, where it is the custom to transplant rice after jute. It has often been urged against Kakya Bombai, that its lateness in maturing would prevent the transplantation of paddy; but the test in question shows that, even if the jute be cut a little earlier, any loss in weight of fibre on this account will be made up in fibre of increased value, because of its improved quality.

Table of results at agencies.

Place.	NAME OF AGENCY.	Local Manager's name.	Area in acres.	Outturn of fibre of Kakya Bombai per acre.	Area in acres.	Outturn of fibre of local jute per acre.	Difference in favour of Kakya Bombai per acre.	REMARKS.
				MD. SR.		MD. SR.	MD. SR.	
Saidpur ...	Messrs. Sinclair Murray & Co.	Mr. E. A. S. Thomas ...	0·63	24 34	0·59	21 29	3 5	Average of three plots of each.
Darwani ...	Ditto ...	Ditto ...	1·0	16 10	1·0	15 17	0 33	Average of four plots of each.
Mymensingh ...	Ditto ...	Mr. J. Vardan	0·96	19 24	0·96	16 24	3 0	Mean of three plots of each.
Domar ...	Ditto ...	Mr. E. A. S. Thomas ...	0·3	20 27	0·28	16 10	4 17	Ditto.
Sarishabari ...	Ditto ...	Mr. A. M. Simmonds ...	0·93	19 14	0·93	17 28	1 26	Two plots of each.
Haldibari ...	Ditto ...	Mr. E. A. S. Thomas ...	...	8 0	...	6 36	1 4	Three plots of each.
Sarishabari ...	Messrs. Landale & Clark, Ltd.	Mr. Cooper	0·25	24 38	0·25	20 24	4 14	Two plots of each.
Elashia ...	Messrs. Sinclair Murray & Co.	Mr. M. Avdall	0·077	34 22	0·07	19 11	15 11	Ditto.
Ditto ...	Ditto ...	Ditto	1·0	19 18	1·0	9 10	10 8	Ditto.
Naraingani ...	Ditto ...	Mr. J. Luke	1·4	12 39	0·85	10 37	2 2	Three plots of each.
Ditto ...	Messrs. M. David & Co.	The Hon'ble Mr. J. W. Hely Hutchinson.	0·12	19 30	0·12	18 20	1 10	Two plots of each.
Chatalpara ...	Messrs. Landale & Clark, Ltd.	Mr. H. Sanbolle	0·45	14 4	0·47	13 4	1 0	Ditto.
Ohaumuhani ...	Messrs. Sinclair Murray & Co.	Mr. A. Gregory	0·25	22 38	0·37	27 13	4 15	Ditto.
Ohandpur ...	Ditto ...	Mr. A. Manuk	0·89	14 11	0·46	11 36	2 15	Ditto.
Niklidampara ...	Ditto ...	Mr. P. A. Sharpe ...	0·38	18 28	0·38	19 10	0 22	Four plots of each.

Use of Kakya Bombai jute in Bihar and Assam.

Kakya Bombai jute has given good results both in Bihar and Assam in comparison with local jutes, and has been accepted for distribution on a large scale in these provinces. Bihar was supplied with 100 maunds of seed (8,000 lbs) in addition to what the Bihar Department produced. An arrangement has also been made to supply 25 maunds (2,000 lbs.) of seed annually to Assam.

There is thus external as well as internal evidence that the work which has been done in this direction is now bearing good fruit.

A note written by the Deputy Director of Agriculture in Bihar, on the progress of Kakya Bombai jute in the jute growing tract in Bihar, is printed as an Appendix.

Water Hyacinth.

Previous reports have dealt with the spread of the aquatic plant water Hyacinth (*eichornia crassipes*) in Eastern Bengal, and with the efforts to find an economic way of clearing the smaller water courses of this tract, and freeing them again for navigation.

The discovery that the plant is a potash absorber, and that its ash contains considerable amount of chloride of potash—varying in genuine specimens from about 15 per cent. to 45 per cent. of K_2O—led, firstly, to the recommendation that the plant should be dried and burnt and secondly to the offer of Messrs. Shaw Wallace & Co. of Calcutta to purchase all ash thus produced.

The recommendation has been accepted in a surprising manner by the inhabitants of the affected districts. and the production of ash is now described by independent observers as "widespread": it certainly amounts to many thousands of maunds (27·3 maunds equal to 1 ton) per annum.

Unfortunately the inevitable difficulties of carrying out such a scheme are now being met with. A detailed survey of the affected districts was made in regard to the richness in potash of the water Hyacinth growing in them. It was found that, excepting in the red soil tract, the ash of good plant contains a minimum of about 18 per cent. of K_2O and that up to 45

per cent of Potash is found in the best ash. It has also been observed that the potash content of a plant is in direct ratio to its vegetative vigour.

In some of the red soil tracts which are, as already stated in another section of this report, comparatively deficient in potash, the plant is generally stunted in growth and the potash content of the ash is low, being about 12 per cent. The red soil tract is however compartively un-important, because the Hyacinth—naturally enough it would seem—is causing most trouble in the silt tracts, which are rich in potash.

It has further been observed that plant growing in deep water i.e. whose roots do not touch the bottom, grows better, and therefore contains more potash, than plant growing in a few inches of water and whose roots penetrate into the ground.

Moreover, while living plant appears best able to absorb potash from water, drying or dead plant loses its potash very easily, by mere washing with water or by exposure to a shower of rain.

Of several difficulties which are being met with in regard to the further development of the scheme for the production of Hyacinth ash, the one of most immediate importance is the production of large quantities of low grade ash, often containing less than 10 per cent. of potash. There is little doubt that a certain amount of deliberate adulteration goes on, but the collection of plant growing in very shallow water, or carelessness in exposing plant to rain during drying, or in allowing rain to fall on prepared ash, is quite sufficient to render low quality a certainty.

The preparation of low grade ash cannot pay either the producer or the buyer, and in future people will be strongly advised not to produce ash for sale from stunted plant ; but to apply it to their own fields in the red soil tracts where the soil is acid. The rotted hyacinth plant is almost, if not quite as good as farm yard manure, and would be more profitable than the ash in the silt tracts, which are rich in potash and not distinctly acid. For the production of ash for sale, people are advised to take their plant from deep water, such as the water courses, whose navigation is being impeded by the Hyacinth.

It is thought that if this advice is acted on, the tracts which are comparatively poor in potash will not lose by the sale of the ash, and on the other hand the clearance of the water courses will be encouraged.

Messrs. Shaw Wallace & Co. have found it necessary to fix a minimum potash content of 15 per cent. K_2O for the ash which they are prepared to buy. Even so, freightage has obviously to be paid on 85 per cent. of worthless matter. Messrs. Shaw Wallace's decision will help to emphasise the advice, detailed above, which the Agricultural Department is giving to producers, and it is to be hoped that this difficulty will soon be got over.

Messrs. Shaw Wallace have been considerably inconvenienced in being unable to get freightage to export the ash they buy. Apart from the locking up of capital, this has meant their having to find storage space for an in definite time for the large amount of ash which they have purchased.

It is perhaps worth mentioning that preliminary experiments have been commenced at Dacca to investigate the possibility of purifying water Hyacinth ash, so as to obtain more or less pure chloride of potash. It is of course too early yet to express any opinion on the prospects of the work.

Sann Hemp.

A good deal of time has been spent in the last six months in experiments with the object of enabling Sann Hemp to take the place of flax in canvas, shoe-makers' thread, etc., and it is hoped that some success has been attained. It is too early yet to speak definitely as apparatus has not yet been available to test the process, and the product, material on a sufficiently large scale. This difficulty will, however, soon be got over as, apart from experimental apparatus at Dacca, two Calcutta jute mills are also putting up experimental plant.

If successful the process will be of far-reaching importance, as it will probably bring another industry to India. Moreover, the increased

cultivation of Sann Hemp, which is a legume and therefore an absorber of nitrogen from the air, would proportionally benefit the land on which it is grown.

Sida.

Sida has been known for many years to botanists and to others interested on the subject as containing a fibre of the same class as jute, viz., a lingo-cellulose, but decidedly finer in texture and having a more glossy appearance. This plant attracted my attention at an early date, but, like others, I was unable to find a race which would desert its bushy habit, and grow straight enough to be cultivated as a fibre crop. Such a plant was, however, found in Burma by Dr. Butler, Imperial Mycologist, and as the result of several years' work, a pure line has been isolated which is practically unbranched and is in every way suitable.

Two years ago a small plot of this plant yielded fibre at the rate of 15 maunds per acre, and in 1917, on a third of an acre sown in June, a return of 14 maunds per acre of fibre was obtained.

The fibre is too fine in texture to be of use in the manufacture of gunnies, so will probably not be in demand in Calcutta, but I sold three bales which I took to London when on leave in 1913, at a price which was 20 per cent. higher than that current for "first marks" jute, and was assured that any quantity of Sida fibre could be disposed of in Europe at prices bearing a similar proportion to that of jute.

Sida is a high land plant and would not be a profitable substitute either for *Corchorus Capularis* in Eastern Bengal, or for *Corchorus Olitorious* in Western Bengal. Jute, however, requires to be sown on early showers before the break of the monsoon; but Sida is capable of producing a good crop of fibre when sown after the break of the rains. It may thus be successful in places like the Central Provinces where the rainfall is ample, but where early showers are lacking, and where jute experiments have therefore failed. A small amount of seed has been sent to the Central Provinces this season, and further multiplication is being carried out at Dacca.

I have again to express my thanks to those of the Calcutta jute firms who have lent an assistance for field experiments in the mufassil. I am specially indebted to Messrs. Suttie and Blount (Messrs. Sinclair Murray & Co.), and to Messrs. Gall, Kinmond Luke and How (Messrs. Landale and Clark). In the mufassal agencies Messrs. Mactavish, Hely-Hutchinson, Luke, Ducat and Stewart of Naraingunj, Messrs. Manuk of Chandpur, Shircore of Serajganj, Thomas of Haldibari and Vardon of Mymensingh have shown genuine interest and given real help.

I am glad to acknowledge excellent work done during the year by Mr. N. C. Basu, M.Sc., Chemical Assistant, Babu Tara Nath Ray, Field Assistant, and other members of my staff.

ROBERT S. FINLOW,

Fibre Expert, Government of Bengal.

APPENDIX.

Extract from the tour report of Mr. McGowan, Deputy Director of Agriculture in Bihar, dated the 5th November 1917.

Jute.—The season has not been favourable for jute on the whole as the sowings were late this year, and the season closed with cyclonic winds which blew the plants down. Some of the jute I saw between Katihar and Purneah was black and the fibre had to be pealed off by hand instead of being beaten; this was due to the plant lying in the field having been blown down, and by the time it was steeped the stem was black with no strength left in its fibre. At Kishanganj and Sarsi the Kakya jute grew to 12 feet, while the plants were half an inch in diameter. Mr. Crow at Sarsi was successful with his crop, and obtained approximately about one and half times the local outturn. The success of the crop in this locality promises to raise the price of the Kakya seed, but it is difficult to say whether this will be the case as jute is now selling for only Rs. 4 a maund, and it is very likely that the area next year will be very much less than in other years. Mr. Crow obtained close on Rs. 7 per maund from Ralli Brothers at Forbesganj for his jute when the local was being sold at Rs. 5-8. Unfortunately most of the crop for seed has been laid low, but probably we will be close on the 200 maunds we arranged for in spite of this; we will not know what quantity will be available for distribution next year till December, and I have arranged for its distribution on the "Sawai" system with the President of the District Agricultural Association. I hope also to be able to distribute the 100 maunds of seed offered by Mr. Finlow, but the whole question depends upon the sale of this year's fibre, and the prospects of this at present are very poor as there is practically no demand. At some centres only Rs. 2-4 to Rs. 3 is being offered by the merchants, so that it is impossible to say at present what course the raiyat will adopt next year. The future of Kakya jute is nevertheless assured even if we have to wait a couple of years for its general adoption, and in the meanwhile those that have already grown it will keep it going in their own localities. As reported previously I am going to try this jute in the flooded maize areas in the vicinity of Sabour next year, and if it is a success only Kakya seed will be given out in South Bhagalpur. I will also ask Mr. Finlow if he can supply me with a few better flood resisting varieties in case Kakya does not do. But it is essential that the cultivator should drop maize in these lands as he loses heavily by growing it.

ANNUAL REPORT OF THE ECONOMIC BOTANIST TO THE GOVERNMENT OF BENGAL, FOR THE YEAR 1917—18.

During the first four months of the year under review the Fibre Expert, Bengal, was in charge of this section from 1st July to 1st November 1917. On 1st November 1917 the Economic Botanist returned from leave and took over charge of the section.

Staff.—There have been no changes or additions to the staff.

Tours.—Since the Economic Botanist took over duty on 1st November 1917, he has been on tour for 27 days, while the other members of the staff together have been on tour for 151 days, during the period of 9 months which the report covers. These tours were entirely for the purpose of inspecting work on rice at various farms and in the districts.

The following items of work were carried on :—

Rice.—The work on rice was continued on the lines previously laid down and several new varieties have been selected which promise to be almost the equal of Indrasail (Dacca No. 1) in yield. Testing of these was commenced last season, and will be continued during the coming year. One of these is a comparatively fine paddy, and, if approximately equal to Indrasail in yield, should be a valuable selection. Indrasail, although of medium quality, is rather too coarse to be palatable to the upper classes. Indrasail continues to maintain its reputation in most of the districts where it has been distributed. During 1917, 2,000 maunds (71·42 tons) were sent out, while 6,000 maunds (214·28 tons) are being distributed now and will be grown during the coming season. A considerable demand for this variety is also springing up in Bihar. During 1917 it was tried very successfully at various centres, and over 500 maunds (17·95 tons) of seed have been sent at the request of the Bihar Department for distribution during the next season.

Of early paddies, a selected variety named *Kataktara* is also promising well. In trials on the Dacca farm average yields of approximately 30 maunds (2,400 lbs.) an acre have been obtained, and a big demand is arising for this seed also, which so far it has not been possible to meet.

In addition to work on transplanted Aman and highland Aus, work has been commenced on the long-stemmed deep water paddies which are grown over large areas of the inundated tracts of East Bengal. As there is no land on the Dacca farm suitable for the growing of these paddies, a tank of about one acre in size has been dug, and about 170 varieties of this interesting type of rice collected from Dacca Division have been sown and are under observation now. A series of terraced plots have also been prepared, with the object of investigating more accurately the water requirements of different varieties.

During the year under review a lot of attention has been paid to determining the quickst and most accurate method of estimating the relative yielding capacities of varieties. From an examination of a large amount of data it would appear that differences of 10 per cent. can be determined with practical certainty by growing the varieties in question within the same *kiari* in alternate plots of 100 plants duplicated about 25 times.

The work on crossing has been continued, and a considerable amount of new data obtained with regard to the inheritance of characters. Particular attention is being paid to the inheritance of size and shape of grain, and several crosses have now been bred to the third generation in this connection.

Work in West Bengal has not progressed so far as in East Bengal, but a survey of the Burdwan and Presidency varieties has been started, and a large collection of these will be grown this year at Chinsurah. Meanwhile, trials of Indrasail against the most popular local paddy, Nagra, recommended by the Deputy Director of Agriculture, are being made. The results are somewhat contradictory, but there appears reason to conclude that Indrasail is the better yielder of the two by about 18 per cent. to 20 per cent. During the past year, season 1917-18, 62 plots of Indrasail and 62 adjacent plots of Nagra worked out in each case to yield per 100 plants, showed a balance in favour of Indrasail in each and every plot, and an average total yield in favour of Indrasail of 23 per cent. The Chinsurah farm results, however, reversed the

above results, giving a total yield for Nagra of 29 maunds (2,320 lbs.) per acre from an area of 41 acres and of 25 maunds (2,000 lbs.) for Indrasail from a total area of 51 acres.

Ufra disease of rice.—The district work on Ufra has been continued, but has been taken over by the district staff, and the work of this office is only advisory, in consultation with the Imperial Mycologist. During the past season large areas in Dacca district (at Nagari and Bikrampur) and in Faridpur (Gopalganj) were burned and ploughed as demonstrations. At Kurmitola in Dacca subdivision the enclosed area, within which remedial measures were carried out in cold weather 1916-17, was kept under observation, and at Pubail, also in Dacca subdivision, an experiment was started in deepening the land and converting it into boro paddy land, as boro paddy does not get the disease. Further details regarding this work will be found in the appended report of the Mycological Collector who has been deputed to supervise and report on the progress of the work. All the above work is being carried out on the recommendation of the Imperial Mycologist, who is making a detailed investigation of the disease.

Other work.—The work on pulses, chillis, oilseeds and fruit has been continued, but there is nothing new to report. A lot of attention has been paid to the mango weevil, the prevention of which would prove an enormous boon to the mango growers in Bengal. This season a notable step has been made by the discovery of the egg of the weevil, and the time of egg laying. This is not, as has been formerly supposed, when the tree is in flower, but when the fruit has attained about half its mature size during the month of April. The eggs are laid singly in small depressions on the surface of the fruit and covered over by a coating of a black viscid substance forming small black spots. As the evidence seems to point to the egg-laying period being confined to a week or two, it would seem that the protection of the fruit during that period, either by sprays or by enclosing in bags, is the line along which preventive measures should be tried. Observations are also being made on certain varieties which appear to show signs of immunity.

The Mycological and Entomological Collectors continued to work under the Economic Botanist during the year. Separate reports are submitted of their work.

All the staff have worked well, and credit is due to Mr. S. G. Sharangapani, Assistant to the Economic Botanist, and to Babus Jajnabhusan Moulick and Paresh Nath Chakraverty, Fieldmen, for carrying on successfully the heavy field work of the section during the absence on leave of the Economic Botanist.

G. P. HECTOR,

Economic Botanist, Bengal.

ANNUAL REPORT OF THE AGRICULTURAL CHEMIST TO THE GOVERNMENT OF BENGAL, FOR THE YEAR 1917—18.

Charge.

I have held charge of the office of the Agricultural Chemist during the whole of the year under review.

Changes of Staff.

Babu Indubhusan Chatterjee, Second Assistant, having been appointed Research Assistant to the Agricultural Chemist in Bihar, Babu Kumud Behari Sen, M.Sc., was appointed as Second Assistant on the 25th March 1918.

Mr. S. N. Bose, who has been under training at Pusa for two years with the Imperial Bacteriologist, took up his duties as Bacteriological Assistant on the 16th January 1918.

Tours.

Mr. Gostabehari Pal, First Assistant, was on tour in the Chittagong Division for 13 days between the 17th February to the 4th of March 1918 in connection with soil survey work.

Babu Indubhusan Chatterjee, Second Assistant, was on tour at Chinsurah for 9 days between the 14th to 28th February 1918.

Provincial Soil Survey.

Considerable progress has been made since the last report was written. Fifty samples have now been examined representing—

(*a*) Eastern Bengal ... { Silt (new alluvium). / Red soil tract (old alluvium).

(*b*) Ditto ... { Silt (new alluvium). / Red soil tract (old alluvium).

The silts in Eastern and Western Bengal shew general similarity in composition, though there are local divergencies which, on closer investigation, it may be possible to account for. High potash content seems to be the most constant character, though there are apparently rare exceptions. There is generally also a sufficiency of phosphoric acid which, in some isolated cases, is present in large quantities. There is a fair proportion of lime salts in Eastern Bengal (averaging about 1·0 per cent.), but there is generally no free carbonate of calcium. In Western Bengal there appear to be greater divergencies in the matter of lime, some soils containing free calcium carbonate, and up to 4·0 per cent. of total lime: others, with no free lime, contain as little as 0·5 per cent. total lime. Nevertheless, while it is very rare to find the percentage of lime in Eastern Bengal as high as that of magnesia, this seems to be fairly often the case in Western Bengal.

The following are fairly typical analyses :—

	Fordnagar, Manickganj, Dacca district.	Putiapara, Rajshahi district.
	Per cent.	Per cent.
Total Phosphoric Acid (P_2O_5)	0·126	0·11
„ Potash (K_2O)	1·42	1·60
„ Lime (CaO)	1·44	1·90
„ Magnesia (Mg. O)	1·72	1·83
Nitrogen	0·064	0·074

The red soils.

The red soils shew comparatively wider differences than the silts; those in Eastern Bengal are, on the whole, probably because of leaching by the greater rainfall, poorer in potash than the red soils of Western Bengal; the other figures are not widely dissimilar, but there is a general tendency towards a higher lime content in Western Bengal. The following are typical analyses :—

	Dacca Farm high land. Eastern Bengal.	Rampurhat, Birbhum, South Western Bengal.	Bogra soil, Western Bengal.
	Per cent.	Per cent.	Per cent.
Total Phosphoric Acid (P_2O_5) ...	0·04	0·028	0·018
„ Potash (K_2O)	0·30	0·66	0·79
„ Lime (CaO)	0·18	0·35	0·20
„ Magnesia (Mg. O)	0·38	0·36	0·32
Nitrogen	0·134	0·049	0·073

Compared with the silts the red soils, shew a general deficiency in phosphoric acid and lime in Western Bengal, and of potash also in Eastern Bengal, and marked effects are actually produced in field practice by manures containing these substances. On the Dacca soil, for instance, it is impossible to grow a normal crop of jute without special dressings of potash and lime, while mustard cannot usually be made to mature without previous manuring

with lime and phosphoric acid. On the other hand, no very authentic results have ever been obtained on the silts by application of either potash, phosphoric acid or lime, and, as a rule the only essential to a first class crop of any kind is a dressing of cowdung.

Alongside the soil analyses an examination of the ash of typical crops is being carried out, and very interesting figures are being obtained, shewing the wide differences in mineral composition which the plant is capable of withstanding. One important result of this work has been the discovery that Rhizoctonia in jute is a potash starvation phenomenon. Rhizoctonia is very common on the red soils of Eastern Bengal, but rare in the silt soils; the ash of jute grown on the red soils may contain as little as 15 per cent. of potash (K_2O), whereas 40 per cent. of potash is often found in the ash of plant grown on silt soil; further, potash manuring has been found to inhibit Rhizoctonia at Dacca. The percentage of potash in the red soils is not so low as to point to the advisability of potash manuring; but the respective ash analyses are far more definite. The soil analyses alone therefore tend to be misleading, at any rate as far as jute is concerned; but things become clearer when the soil analyses and ash analyses are read together.

There are, however, points which it is still difficult to explain. The application of, say, 100 lbs. of potash (K_2O) per acre produces, as already stated, a marked effect on a jute crop at Dacca; but this does not take place unless lime is added too, and yet, in such a case, the lime content of the ash will actually diminish. On the other hand, the potash percentage rises by about 3 per cent. from 16 per cent., to 19 per cent.; but although the crop may have been a remarkably fine one, the potash percentage of its ash remains only about half that of plant grown on silt land.

Typical analyses of the ash of jute grown at Dacca and Rangpur are given below:—

	Red Soil (Dacca).			Silt Soil (Rangpur.)
	No lime plot.	Similar land, limed, (2,400 lbs. per acre.)	Similar land manured with lime 2,400 lbs.) and K_2O (100 lbs.) per acre.	—
Potash	16·72	19·52	19·13	41·62
Lime	26·15	25·78	24·39	16 57
Magnesia	10·60	8·15	9·03	3·22

In the present year an attempt is being made, to see how far it is possible, by very heavy potash manuring, to influence the composition of jute ash. This question is one of very wide interest for, apart from rhizoctonia in jute, fungus diseases in other plant-sp'geon pea wilt in *rahar* (*cajanus indicus*) for instance—seem to be distinctly associated with differences in the composition of the ash of the host plant. Moreover it seems possible to induce such differences in ash composition by suitable treatment of the soil.

Sugarcane.

(*a*) *Examination and selection of local canes.*—In the last year the work of comparing local varieties of sugar cane was continued, and out of 51 specimens collected in 1915-16, a selection of 10 has been made, on the basis of analytical results, and of personal experience of the respective canes in the field. The selected canes will again be compared amongst themselves, with a view to final selection of one or two varieties.

In making the final selections the very different conditions which exist in various parts of the province of Bengal will have to be borne in mind. For instance Rajshahi is somewhat similar to Bihar but with a better rainfall. In

Faridpur and in several other tracts the sugarcane crop has to exist for a considerable portion of its period of growth in land which is probably always water-logged, and often inundated to the depth of a foot or so. In the red soil tracts of Dacca and Mymensingh on the other hand the crop has to withstand almost arid conditions in the latter portion of the season. It is conceivable, therefore, that a cane which will suit one tract may not do for another, and until this point is settled it will be necessary to retain the best types of cane grown in the respective tracts.

Of the local canes, *Gandari* from Dacca, *Vendamukhi* from Rajshahi *Samsara* from Burdwan and *Marikul* from Mymensingh, appear to be the best; the three first are well known, but *Marikul*, which is a thinnish dark red cane, of vigorous growth and high sucrose content, does not seem to have met with any previous wide recognition.

(*b*) *Exotic canes*:—Of the exotic canes, Yellow Tanna and J. 247, the latter supplied by Dr. Barber, seem to withstand the conditions at Dacca best; but the last two seasons at Dacca have been highly unfavourable, owing to prolonged drought in the early part of the season, and other more delicate races were unable to establish themselves. This in itself is a recommendation for the above two canes.

Hitherto sufficient setts of J. 247 have not been available. but tests will be made this year at Dacca, and it is hoped to extend the trials next year to Rangpur, Rajshahi and Chinsurah.

At Rangpur, in 1916 and in 1917, Yellow Tanna gave the best yield of gur and *Gandāri* was second. At Rajshahi and Chinsurah in the same two years Yellow Tanna gave the best average yield of gur per acre; in 1917 at Chinsurah Striped Tanna beat Yellow Tanna.

With respect to the comparative merits of local and exotic canes the following remarks from my progress report on sugarcane for the current year are quoted :—

"The conclusion to be drawn from the experiments recorded above are, that at three out of four experiment stations in Bengal, an exotic race generally leads the way in the matter of yield, as compared with local varieties."

"On the other hand at Dacca, Chinsura, and Rangpur there are local canes, namely, *Gandari*, *Samsara* and *Vendamukhi*, respectively, which, if not equal to the best exotics, are still capable of profitable cultivation.

"It would appear that, in most cases, exotic canes are not capable of retaining their good qualities indefinitely; but as far as Bengal is concerned, Yellow Tanna seems to be an exception. It has been grown in the province for many years now, and while still, on the average, one of the best, if not actually the best, gur-making canes, it is also probably the most robust variety. Noel Deer states ('Cane Sugar' page 29) that 'generally speaking they (Tanna varieties) are deep rooters and suffer only to a limited extent from the effects of drought.' This might have been written from experience with Yellow Tanna on the red soils at Dacca."

A second cane has shown great vigour at Dacca in the last two years. This is J. 247, which, while tillering freely and growing to a great height, appears to resemble Yellow Tanna in its drought-resisting properties. Sufficient sets of J. 247 will be available next season for an extended test at each of the four experimental stations in the province.

Both Yellow Tanna and J. 247 appear to be canes whose juice is only of moderate purity. Therefore, while excellent as far as gur-making is concerned, they might be at a disadvantage as compared with some other canes when white sugar is the object.

Disease.—During the last two or three years there has been a good deal of disease at Dacca, and at the commencement of the present season, it was decided to rigidly select the canes which were to be used as sets. Each of these canes was examined and passed by the Entomological and Mycological Collectors, and it is probable that the greatly improved appearance of the cane this year is due partly to the care thus exercised, as well as to a favourable season. The selection will be systematically pursued each year in

Date Sugar.

Owing partly to the necessity of concentrating on the soil work, but partly also because of the considerable amount of analytical and other work involved in the sugarcane experiments at Dacca, it has been found impossible to proceed with the investigation into date palm sugar. Failing further assistance this work will probably remain in abeyance for another year or so, until the sugarcane selection work, which is of undoubted importance for the whole province, approaches its conclusion.

I am glad to acknowledge the good work done by Babus Gostabehari Pal, M. S.c., and Indubhusan Chutterjee, First Assistant and late Second Assistant to the Agricultural Chemist, who have carried out a large number of important analytical determinations with conscientious care.

ROBERT S. FINLOW,
Actg. *Agricultural Chemist,*
to the Government of Bengal.

ANNUAL REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, EASTERN CIRCLE, FOR 1917-18.

I took over charge of this circle in November from the Director of Agriculture, who was supervising the work since the deputation of Mr. K. McLean on military duty. During this period I was on tour for 141 days, and visited in connection with the inspection of farms, divisional stores and demonstrations the following districts:—Darjeeling, Rajshahi, Rangpur, Bogra, Jalpaiguri, Mymensingh, Faridpur, Bakarganj, Chittagong, Comilla, and Noakhali.

The year under review has been one of continued progress.

Season.—Although the weather had started favourably, on the whole it was bad throughout the year. Insufficient rainfall in July and August prevented the timely transplantation of aman paddy. Heavy showers in September and October accompanied by storm were injurious to paddy and sugarcane, and delayed the sowing of rabi crops including potatoes and vegetables. The drought in February and beginning of March was very injurious to rabi crops.

Demonstrations.—(1) *Paddy Dacca No. 1 (Indrasail).*—The demonstration work on this paddy is now practically over in the Dacca Division. Those who have once tried it have accepted it as the heaviest yielder, and it is now more a question of having the seeds distributed widely than anything else. With a view to popularize the multiplication of this high yielding variety by the raiyats about 164,000 lbs. of seed paddy were distributed during the year in 10-lb. bags. As a result of exhaustive enquiries it was found that all growers had preserved their own seeds, and helped in the automatic expansion among their neighbours either by a change or by sale as stipulated. Moreover, the quantity distributed last year has been recovered in full. A start was made in other divisions also. Arrangements have been made for the distribution of about 410,000 lbs. (5,000 maunds) of this paddy in 10-lb. bags in the Dacca, Chittagong and Rajshahi Divisions next season. In addition to this 300 maunds have been sent to the Western Circle and over 500 maunds supplied outside the Presidency.

(2) *The Fibre Expert's selected jute seed, Kakya Bombai No. 7* (C. Capsularis).—The superiority of this variety has been thoroughly established in the *Capsularis* tracts, and seeds have been distributed exactly on the same lines as the paddy, excepting that no return of seed is required from the growers, the only condition stipulated being that they should use the crop exclusively for propagation of sufficient seeds to sow their own areas next year. The jute firms, as in previous years, have continued the demonstrations, and some of them are compairing the variety with the Deo Pat (*Corchorus Olitorious*). The results of the trial are awaited with interest.

Last year 8,200 lbs. of Kakya Bombai jute seeds were distributed in ¼lb. packets throughout the circle for trial and seed production. Over 90 per cent. of the people taking these have been satisfied with the results and kept their seeds. In some localities this variety has already to a great extent ousted the local varieties. This year the demand for seed has greatly exceeded the supplying capacity of the Department.

The actual quantity distributed and sold is noted below :—

	Distributed.	Sold.
	Mds.	
Dacca Division ...	... 415	100
Rajshahi „ ...	... 370	197
Chittagong „ ...	... 81	...
For jute agency experiments	18—19—12.	

(3) *The value of Bonemeal and lime on the acid red soil.*—Demonstrations conducted in the several centres have shown that an extra yield of about 10 maunds per acre can be obtained by the application of these manures. Owing to the proverty of the raiyats, however, they are unable to purchase these, even if they are anxious to do so. Much in the way of expansion will naturally depend upon the support and co-operation of the credit societies and the zamindars. The Government are also considering the question of granting agricultural loans for the purchase of manures of proved value to cultivators in areas where advances from co-operative societies are not available to them.

(4) *The introduction of the Hill Potato seeds.*—Cultivation of the potato crop has now been fairly introduced in this circle. The red Darjeeling variety still gives the highest yield in the plains.

The following statement shows the distribution of seed potatoes in the three divisions and average outturns obtained per acre by the growers :—

	Amount supplied.	Outturns, average.	
	lbs.	lbs.	
Dacca Division ...	123,508	8,534	per acre.
Rajshahi „ ...	40,016	11,250	„
Chittagong „ ...	31,928	7,560	„

Considering the fact that the crop is a recent introduction into the Dacca Division, the demand for seed is very encouraging. The main difficulty in the way of a rapid expansion of the crop is the cost of seed which has to be renewed annually to get the best results. It is doubtful if much progress can be made without the help of co-operative societies.

(5) *Sugarcane.*—Demostration of the better varieties of sugarcane has been continued. *Vendamukhi*, B. 147, Dacca *Gandari* and the Tannas have been uniformly successful wherever tried. During the year about 2 lakhs of cuttings were distributed.

(6) *Tobacco.*—The success of the Sumatra tobacco in the Burirhat farm has led to an extension of its cultivation to the surrounding villages. The services of a cigar roller for the Burirhat farm have been obtained from Madras, with the main object of training up young boys of the district in the art, establishing it—if possible—as a home industry. To avoid the high initial expenditure in the construction of curing sheds, an experimental shed has been erected in the tobacco farm to serve the combined purposes of a byre and tobacco curing house.

(7) *Cotton.*—Owing to the high price of cotton fabrics and the consequent eagerness of the people to grow cotton to spin and weave their own yarns, there has been a general demand throughout the circle for the supply of cotton seeds. Every effort is being made to supply the seeds and help the people with any advice they may want. A small leaflet regarding the cultivation of the crop has been circulated. Up to date orders to the amount of 300 maunds have been registered.

(8) *Miscellaneous crops.*—The following miscellaneous crops have also been tried in places with good results :—

(*a*) *English vegetables.*—Sold in 2-annas packets. English vegetables although highly appreciated, are not readily available in this circle, excepting in a few of the big towns. With a view to meet a genuine demand for seeds of these, arrangements were made with seed growers in England and Bombay for the supply of such seeds in anna packets, which were sold to the extent of over Rs. 2,500 worth.

(*b*) Preliminary trials of groundnuts in Bakarganj and Faridpur are promising.

Water Hyacinth—a rank aquatic weed common all over the low lying tracts.—The ash from this plant is a good manure for jute in the red soil. Large quantities of the ash have been prepared and sold to the agents of Messrs. Shaw Wallace & Co. The practice of preparing ash in the rains has been found to be undesirable, as a high percentage of potash is liable to be washed out. A leaflet has been published to warn people against this.

(9) *Trial of new seeds raised by the Economic Botanist and Fibre Expert.*—(1) *Olitorious jute*—R. 26—. This year about 1,237 lbs. of this seed have been distributed for trial in the *Olitorious* growing tracts of the Circle.

(2) *Kataktara paddy.*—A fine and heavy yielding aus. A preliminary distribution of about 100 maunds of seed of this variety has been made and the results are awaited with interest.

Experimental Farms.—The following farms lie in the Eastern Circle :—

(1) Dacca Farm.
(2) Rajshahi Farm.
(3) Burirhat Farm.
(4) Rangpur Demonstration Farm.
(5) Rangpur Cattle Farm.

During the year arrangements had been made to convert the Rangpur Demonstration Farm into a district farm. The idea has since been put to effect and the present District Agricultural Officer of Rangpur is also the Manager of the farm.

No other administrative changes of this kind have been made in any of the other farms.

1. *Weather as affecting the farm crops.*—During both seasons the weather on the whole was unfavourable with insufficient rainfall in July and August and heavy showers in September and October. All the farms were more or less affected.

2. *Reclamation and laying out.*—During the year every endeavour has been made to extend the experimental areas of the farms by careful levelling and laying out of new plots. A very substantial advance in this direction has been made in all the farms, and specially in the Dacca farm, where the unsightly ravines have been converted into regularly shaped blocks. Many drains have been dug, roads improved and uniform plots prepared. In all the farms series of plots are being tested with a view to standardization.

3. *Experiments.*—Systematic experiments were continued on the staple corps such as jute, paddy (aus and aman) and sugarcane (native and exotic) as well as with manures. Details of results will be found in the reports of the individual farms.

4. *Seed production.*—The undernoted amounts of seeds were raised and distributed from the various farms :—

	Indrasail.	Kataktara.	Sugarcane. Setts.
	lbs.	lbs.	
Dacca	88,860	36,038	73,550
Rajshahi	25,666	...	140,000
Rangpur Cattle Farm... ...	10,524	...	73,550
Burirhat Tobacco Farm ...	...	...	...
Rangpur District Farm ...	4,100	...	11,238

5. *Fodder crops.*—It has been decided that each Farm must grow sufficient fodder for its own use. This year the farms grew fodder as follows :—

—	Maize.	Oats and Peas.	Jowar.	Khesari.
	Acre.	Acre.	Acre.	Acre.
Dacca ...	...	...	18	...
Rangpur Cattle Farm* ...	9	70	41	...
Rangpur Demonstration Farm ...	...	3	·94	1·63
Burirhat ...	...	20·33	1	...
Rajshahi ...	...	1·8	2·66	12·33

* In the cattle farm two small plots of Barseem and Lucerne were grown with success.

One pukka silo has been built in the Rangpur Cattle Farm. At the Dacca farm green fodder was ensilaged in pits with good results.

6. *Potatoes.*—The Darjeeling red variety has been tested against some English and Khasi Hill Potatoes. All the results are in favour of the former.

7. *Sugarcane.*—Vrieties of canes have been tested on all the farms except Burirhat. Comparative yields of gur of the best varieties at each station are given below :—

—	Outturn per acre.			
	First.	Second.	Third.	Fourth.
Dacca Farm ...	J. 247 6,007 lbs.	Gandari 4,026 lbs.		
Rangpur Cattle Farm ...	Striped Tanna 5,740 lbs.	Yellow Tanna 5,412 lbs.	Gandari 5,174 lbs.	B. 147 4,652 lbs.
Rangpur Demonstration Farm ...	Gandari 4,723 lbs.	Red Mauritius 3,304 lbs.	B. 147 3,238 lbs.	B. 312 2,792 lbs.
Rajshahi Farm ...	Yellow Tana 11,642lbs.	Striped Tanna 10,872 lbs.	Vendamukhi 8,755 lbs.	B. 147 8.058 (partly blown down).

8. *Cattle.*—The general condition of the cattle in the farms has been satisfactory. There had been only few deaths and no cases of contagious or infectious diseases.

9. *Implements.*—The following implements have been regularly used on the farms and found suitable for strong bullocks :—(1) Punjab Plough, (2) S.T. Harrow, (3) Disc Harrow, (4) Cambridge Roller, (5) Zigzag Harrow and (6) Planet Junior Hand Hoe. Of these Nos. (2) and (6) have gained popularity among cultivators. Both these, however, are rather costly, and attempts are being made to manufacture them at Dacca at cheaper rates.

10. *Training of Apprentices.*—During the year under review no new apprentices were taken. Four of the last year's recruits continued their training. A number of young men came and received training as expert cultivators without guarantee of employment. Their number was as follows :—

Dacca	...	20
Rangpur	..	6
Rajshahi	...	2

11. *Rangpur Cattle Farm.*—The policy of the Rangpur Cattle Farm has been altered with the object of obtaining definite results within a reasonable time as to the respective merits of crossing with a stock imported from up-country and in grading up indigenous cattle of a definite type. The whole herd has been divided into two, one going with a pedigree Hansi bull, and the other with a farm bred country bull. The herds are grazed and kept separately.

The arable area is now mainly under fodder crops, chiefly maize, jowar, oats and peas.

A pukka silo has been constructed as an experiment.

12. *Seed Stores.*—During the year a large quantity of Indrasail paddy and Kakya Bombai jute seeds have been supplied from the Divisional Seed Stores. The work of the Divisional Seed Stores has thus become very heavy, and with a view to relieve the Divisional Superintendents for more important works proposals for decentralization into District Stores have been made.

13. *Appointment of District Agricultural Officers.*—Owing to the expansion of the demonstration work District Agricultural Officers are being appointed in every district in the circle with the exception of Noakhali, where a senior Farm Overseer has been deputed to do the work, and Rajshahi, where the farm staff will do the needful. These two districts. it is hoped, will have their own officers next year. More efficient and concentrated work is expected as a result of this increase in staff.

14. *Agricultural Exhibition.*—For want of funds few Agricultural exhibitions were held during the year under report. The exhibitions at Faridpur and Paikor (Bogra), however deserve mention. Practical demonstrations with improved implements such as harrows, hoes and iron ploughs were conducted. Quantities of our improved seed (jute and paddy) were also put up and sold.

15. *Agricultural Associations.*—In this circle cultivators have always been approached direct, and the need of Agricultural Associations never felt. There are, however, three District Agricultural Associations, viz., at Rangpur, Bogra and Malda, existing for a long time. All of them have done useful works.

16. *Acknowledgment.*—My best thanks are due to the administrative officers all over this circle, who have always helped with advice and co-operation. The jute firms have also rendered me great assistance, among whom Messrs. Sinclair Murray and Messrs. Landale and Clarke may be specially mentioned. The Superintendents of Agriculture and the District Agricultural Officers deserve my sincere commendation for their energy and devotion.

R. DAS GUPTA,

Offg. Deputy Director of Agriculture,

Eastern Circle.

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, DACCA DIVISION, FOR 1917-18.

Staff.

The staff consisted of one Superintendent, four District Agricultural Officers and 34 Fieldmen Demonstrators (31 paid by the Government and 3 paid by the Court of Ward's estates, Bakarganj). In addition to the above, a temporary staff of 50 men was entertained for jute and paddy seed distribution, ufra survey and jute forecast.

Babu Rajeswar Das Gupta, M.R.A.S. (Eng.), was in charge of the division up to October 1917, when he was appointed as Officiating Deputy Director of Agriculture, Eastern Circle, and I took over charge of this division from him in November 1917.

Tours.

The number of days on tour and the principal places visited by the officers in the division are noted below :—

Name and designation of the officers.	Number of days spent on tour	Name of important places visited.
Babu Rajeswar Das Gupta, Superintendent of Agriculture, up to October 1917.	98	Calcutta, Faridpur, Rajbari, Manipur, Gopalganj, Madaripur, Bashbari, Pubail, Tangi, Mymensingh, Kishoreganj, Bhairab, Sarisabari, Jagannathganj, Gaffargaon, Jaidebpur, Kaoraid, Sripur, Godnail, Kashipur, Bhola, Narayanganj, Khulna, Darjeeling, Ati, Taltala, Mirkadim, Kamalapur, Sherajdha, Arail, Singhjani, Kurmitala, Fatulla, Munshiganj, Barisal, Tarpasa, Kalma, Shilimpur, Outshahi, Shavar, Mirpur, Rangpur, Dhankunia, Manikganj, Saidpur, Kaliganj and Gopalganj.
Babu Jamini Kumar Biswas, Superintendent of Agriculture, up to 30th March 1918.	89	Barisal, Calcutta, Manipur, Faridpur, Mymensingh, Tarpasa, Kishoreganj, Sarisabari, Gaffargaon, Kaliganj, Jaidebpur, Godnail, Narayanganj, Bhola, Gournadi, Kurmitala, Rangpur, Khulna, Taltala, Sherajdha, Munshiganj, Sripur, Tangi, Bhairab, Saidpur, Kaoraid, Mirpur, Ati, Madaripur, Rajbari, Gopalganj and Kashipur.
Babu Santi Prasad Sen Gupta, District Agricultural Officer, Dacca.	213	Narayanganj, Raipur, Daulatkandi, Ramnagar, Fatulla, Godnail, Saidpur, Munshiganj, Lohajung, Kalma, Dhankunia, Bharakar, Ati, Kumarbhog, Mirkadim, Manikganj, Aricha, Jalaldi, Shavar, Mirpur, Malaitia, Thagharia, Tangi, Pubail, Jinard, Kaoraid, Joydebpur, Mirmitala and Kalma.
Babu Satindra Lal Sen, District Agricultural Officer, Mymensingh.	204	Jamalpur, Kishoreganj, Tangail, Netrokona, Iswarganj, Fulpur, Haluaghat, Gauripur, Bhairab, Bajitpur, Sarisabari, Sherpur, Badyaganj, Kalirbazar, Piyarpur, Katlasen, Saltia, Nandina, Narundi, Ranarampur, Bhadurpur, Dhala, Atharabari, Shambhujani, Nilganj, Gochipata, Sarachar, Maderganj, Mahirpur, Fulkocha, Kendua, Elasin, Dhamakora, Prodyotnagar, Dagi and Sarisabari.
Babu Debendra Nath Mitra, District Agricultural Officer, Faridpur.	219	Bhanga, Talma, Sadarpur, Abdulabad, Bhangeswardi, Kistapur, Chandpur, Goalundo, Rajbari, Pangsa, Baliakandi, Sunapur, Madaripur, Palong, Bhojeswar, Charmugaria Sibcha Panchakhola, Kolapara, Gopalganj, Madhupur and Damudi.
Babu Surendra Nath Sen, District Agricultural Officer, Barisal.	175	Bhola, Pirojpur, Patuakhali, Baofal, Daulatkhan, Kanthakhali, Lotu, Wahirpur, Babuganj, Mothbaria, Pahaerhat and Dacca.

Demonstrations.

(*a*) *Introduction of superior varieties of seeds raised by the Experts.*—The superiority of the Economic Botanist's paddy (*Oryza sativa*) and the Fibre Expert's Kakya Bombai jute (*Corchorus capsularis*) to local varieties has been well established. The *raiyats* have been thoroughly convinced of its superiority both in quality and yield. The rice is of medium quality as is ordinarily taken by middle class people.

During the year under report about 2,000 maunds or 164,000 lbs. of Indrasail paddy were distributed, and it has been arranged to distribute 1,945 maunds or 159,490 lbs. quantity of seeds in the next year.

Kakya Bombai Jute seed.—Its superiority over the local ones has been amply proved. Our main work now is to distribute the seeds widely in ¼-lb. bags for further propagation.

Messrs. Sinclair Murray & Co., Landale Clarke, Ltd., and Chittagong & Co. at Narayanganj, Godnail, Mymensingh, Sarishabari and Elashin continued the demonstrations with this variety as in previous years, and the results have been in favour of Kakya Bombai in every case, as will be seen from the Fibre Expert's report.

Last year 8.200 lbs. of jute seeds were supplied free to the cultivators of this division in ¼-lb. bags as shown below :—

	Mds.	lbs.
Dacca	50 or	4,100
Mymensingh	49 ,,	4,018
Faridpur	1 ,,	82
Barisal	*Nil.*	

This year the following quantities of seed have been distributed in ¼-lb. bags as follows :—

	Mds.	lbs.
Dacca	150	12,300
Mymensingh	150	12,300
Faridpur	75	6,650
Barisal	40	3,280

To guard against Rhizoctonia and Diplodia all seeds were treated with a solution of copper sulphate before being sent out. The germination has been very good. The Managers at all the jute agencies at Narayanganj, Dacca and Mymensingh have started comparative tests with *Corchorus Olitorius versus Corchorus Capsularis* (using Kakya Bombai as a standard). The results are awaited with interest.

Effect of Bonemeal and lime on red soil.—The effect of bonemeal and lime on the acid red soil has been fully established on paddy. About 32,800 lbs. have been sold during the year. An average net profit of Rs. 20-6-9 per acre has been obtained in the Dacca district and Rs. 6 in the Mymensingh district.

Introduction of potatoes.—The quantities of seed potatoes sold in the different districts are given below :—

	lbs.	
Dacca	36,285	The season was very late and dry, and as such the outturn was rather poor. It varied from lbs. to lbs. per acre.
Mymensingh ...	33,210	
Faridpur	36,640	
Barisal	16,400	

The cultivation of this crop has now been established in this division. The poverty of the cultivators, however, and the high initial cost of seeds is standing in the way of a rapid expansion, but co-operative societies and Court of Ward's estates are coming to help tenants with funds.

Sugarcane cuttings.—The demand for sugarcane cuttings has been as great as in the previous year, but a limited number has been supplied to each district. Tanna, Dacca Gandari and B. 147 have been the most popular.

Introduction of new crops.—Mention may be made of transplanted paddy in Palong in the district of Faridpur, groundnut in Barisal and tobacco and vegetable seeds in all the districts.

Implements.—Planet Junior hand hoe, small iron plough and spring tooth harrow meet with approval, but the price stands in the way of introduction. An attempt has been made to introduce cheaper harrow and hoes. During this year 12 Planet hoes and 31 iron ploughs have been sold.

Miscellaneous.

(*a*) *Ufra.*—Burning of stubbles has been continued as in previous years. With a view to see whether the ravages of the pest could be checked by change in the cultivation, badly affected tracts in the districts of Bakarganj Dacca and Faridpur have been sown with deep water aus. With the same object of view, a few acres in land in the Dacca district were dug up and deepened and converted into boro last year. The crop has been very promising ; if these changes in cultivation answer well, there is every hope of avoiding the pest and its damage.

(*b*) *Water Hyacinth.*—It has been proved that the ash from this plant is quite a good manure for jute, containing, as it does, about 10—20 per cent. of potash. As far as my information goes about 10,000 maunds of ashes were made during this year, of which a greater portion has been sold. A printed leaflet has been issued by the Department explaining how to produce it best.

(*c*) *Cotton seeds.*—Owing to high price of cloth the people of all the districts are asking for cotton seeds. For this year about 200 maunds of seeds have been requisitioned from the Punjab and Bombay. A Bengali leaflet on the method of cultivation has also been printed and circulated.

(*d*) 4,100 lbs. of Kataktara, a medium fine variety of heavy yielding aus paddy, have been distributed among cultivators for trials.

Exhibition.—Faridpur Agricultural and Industrial Exhibition was held in January 1918. Working demonstration of harrows, hoes and iron ploughs were

given and samples of our improved seeds, etc., were exhibited and sold. Excellent crops of potatoes, tobacco and English vegetables were grown on the exhibition grounds for practical demonstrations. Series of meetings were also held with Presidents of Panchayats and agricultural matters discussed.

Seed Stores.—The Dacca Seed Store was started in 1915. Since then it has been in direct charge of the Superintendent of Agriculture, Dacca Division, who was assisted by a clerk. The store has supplied a large quantity of seeds and manures as will be seen from the following :—

		Mds.	srs.	ch.
1.	Indrasail paddy	1,967	15	0
2.	Kakya Bombai jute seeds	514	21	0
3.	Bonemeal	10	0	0
4.	Kataktara paddy seeds	46	0	0
5.	Sugarcane cuttings	4,000	Nos.	
6.	Bonemeal	410	0	0
7.	Paddy	514	5	0
8.	Cowpea	10	0	0
9.	Arhar	3	0	0
10.	Joar	0	7	0
11.	Tobacco (leaves)	1	26	8
12.	K. B. jute seeds	197	38	0
13.	Potatoes (supplied by Deputy Director of Agriculture and Rs. 476-7-9 billed for from Seed Stores)	1,494	14	0
14.	Vegetable seeds	1,990	packets	
15.	Iron ploughs	31	Nos.	

Articles in items Nos. 1 to 5 were supplied free.

The accounts were kept in the printed forms prescribed by the Department. It will be seen from Statement below that there has been a net profit of Rs. 28 after meeting the cost of house rent and establishment charges. It is hoped that with the increase popularity of the seed store and higher transaction with the raiyats and the public, next year the profit will be increased substantially.

Acknowledgment.—Our best thanks are due to the District Administrative staff, to the Collectors, Subdivisional Officer, Secretaries and the Chairmen of the Central Banks, and to the Manager of Court of Ward's Estates for their kind help and co-operation. Special thanks are due to Rai Saheb Jogesh Chandra Dutta, Mr. F. M. Abdul Ali, Subdivisional Officer, Mymensingh, Babu Sachi Kanta Ghose, Circle Officer, Dacca, and Mr. J. N. Bannerjee. Private Secretary to the Bhawal Court of Ward's Estate, for the interest they have taken in works of the Department. All District Agricultural Officers have worked with zeal and devotion and deserve commendation.

J. K. BISWAS,

Offg. Supdt. of Agriculture, Dacca Division.

STATEMENT II.

Statement of Assets and liabilities of the Dacca Divisional Seed Store for 1917-18.

Assets—

	Rs.	A.	P.			
Total amount in cash realised from sale in year under report	7,058	7	7			
Deduct outstandings of last year realised in year under report	4,390	3	5			
Cash receipts of current year	...			2,668	4	2
Bills outstandings	10,742	2	8			
Deduct bills outstanding issued before 1st April 1917	2,026	5	2			
Deduct on account of estimated bad debts and non-realisable	50	0	0	8,665	13	6
Sale-proceeds				11,334	1	8

Liabilities—

Rent	900 0 0		
Deduct on account of rent for the office of the Superintendent of Agriculture and the District Agricultural Officer at Rs. 25 each	600 0 0	300 0 0	
Establishment	499 13 5		
Contingencies	724 0 0		
Depreciation on materials for storing at 5 per cent.	50 0 0		
Packing and freight charges	226 0 0		
		1,499 13 5	
Cost of purchasing stores	13,410 6 0		

Deduct—

(1) Cost of bags purchased in connection with the distribution scheme ...	4,000 0 0		
(2) Price of bonemeal purchased, supplied and billed for last year	1,433 10 0		
		7,976 12 0	
Cost of price of stock in hand on 1st April 1917	2,736 14 0		
Cost of price of stock in hand on 31st March 1918	1,007 1 0		
Total ...	1,729 13 0		
Deduct transfer of stock to the Dacca Farm for demonstration	200 0 0	1,529 13 0	
		11,306 6 5	
Profit and loss account		27 11 3	
Total ...		11,334 1 8	

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, RAJSHAHI DIVISION, FOR THE YEAR 1917-18.

During the year under review I was in charge of the division, assisted by four District Agricultural Officers, eight Demonstrators and 25 temporary hands retained in connection with the jute forecast work and the distribution of the departmental paddy and jute seeds. The District Agricultural Officers were posted as follows :—

Babu Harakumar Guha	Pabna.
,, Benodelal Mukherjee, B. AG.	Malda.
,, Jogesh Chandra Ray, B. AG.	Bogra.
,, Mohini Mohan Ghosh	Rangpur.

The district of Rangpur was under the charge of the Superintendent of Agriculture, Rangpur Cattle Farm, till the 31st January 1918, when I took over charge of the work from him.

I was out on tour for 215 days, the District Agricultural Officer, Pabna, for 218 days, the officer for Malda for 230 days, that for Bogra for 81 days and the District Agricultural Officer for Rangpur for 191 days. The Demonstrators were put in charge of small areas (five miles radius) and were posted at Bogra, Rajshahi, Khanjanpur, Serajganj, Bharenga, Burirhat, Kurigram and Gaibandha. The temporary hands were constantly on the move.

The following is a list of important places visited by me and the District Officers:—

Superintendent of Agriculture ...	Natore, Dighapatia Lallore, Surda, Charghat, Mirganj, Santahar, Naogaon, Hili, Bogra, Khanjanpur, Sukanpukur, Sherpur, Pabna, Serajgani Sara, Ishurdi, Malda, Dinajpur, Rayganj, Churaman, Harischandrapur, Parbatipur, Rangpur, Kurigram, Gaibandha, Lalmonirahat, Mahimaganj, Saidpur, Siliguri, Jalpaiguri, Alipur, Duars, Haldibari and Godagari.
District Agricultural Officer, Pabna ...	Sadar, Serajganj, Sara, Ishurdi, Dashuria, Bharenga, Sahazadpur and Chouhali.
District Agricultural Officer, Rangpur	Pirgacha, Gangachara, Kaunia, Tushbhandar, Hatibandha, Teesta, Lalmonirhat, Mohendranagar, Mahimaganj, Fulchari, Bonarpara, Bamandanga, Nilphamari, Saidpur, Darwani, Domar, Dimla and Chilhati.
District Agricultural Officer, Malda ...	Harischandrapur, Chanchal, Rayganj, Dinajpur, Churaman, Parbatipur and Siliguri.
District Agricultural Officer, Bogra ...	Phulbari, Dhora, Sherpur, Khanjanpur, Santahar, Joypurhat, Sukanpukur, Sonatala, and Paikore.

Demonstrations.

The items were the same as in previous year, more stress being laid on the distribution (for trial) of the seeds raised by the Fibre Expert and the Economic Botanist.

Bonemeal.—It has been definitely proved that on the alluvium this manure has no appreciable effect. Its use has, therefore, been discontinued except on the red soil tracts. The manure was tried in Hili, Sukanpukur and Godagari (all red laterite soil) last year with good results. In some plots sown with Indrasail paddy, the increased outturn went up to 3 maunds per bigha where bonemeal was used. Its use as a manure for fruit trees, however, has become common in some parts.

Potatoes.—This year altogether 567 maunds 10 seers or 46,514 lbs. of the Darjeeling Hill potato seed were supplied to the people. The season being an unfavourable one, the general outturn was slightly lower. Records were kept of 213 plots. The yield per acre of those plots ranged from 8,610 lbs. to 18,600 lbs., the average from all the plots being 11,250 lbs. per acre. The best results were obtained in Joypurhat, Phulbari and Bharenga, where the outturn in very few cases was lower than 53 maunds (13,048 lbs.) per acre.

For this crop castorcake, as an artificial manure, has been proved to be the best when applied at the rate of about 750 lbs. to the acre. Green manuring supplemented by about 300—400 lbs. of castorcake per acre has also given very good results.

Green Manuring.

Green manuring aman paddy with dhaincha and potatoes with cowpea has given satisfactory results. During the year 2,000 lbs. of dhaincha seeds and 7,000 lbs. of cowpea seeds had been supplied. Of these two, cowpea is the greater favourite with the cultivators; 50 maunds of this seed had been supplied in Rangpur district alone.

Manures found satisfactory and generally recommended :—

(1) Castorcake for sugarcane at the rate of about 1,700 lbs. per acre.

(2) Castorcake for potatoes at the rate of 750 lbs. per acre.

(3) Nimcake at the rate of 6 maunds per acre as preventive against the ravages of white ants.

(4) *Nitrate of soda for vegetables, etc.*—At Malda very good results have been obtained by the use of this salt with mulberry plants, the increased outturn of leaf being quite high, sometimes more than double or treble on ordinary crop.

(5) The use of lime in acid soils (9 maunds or 738 lbs. per acre).

Sugarcane.—The local cane Vendamukhi is generally recommended in places where no pigs exist. The Tannas, B. 147 and Gandari are also recommended as superior varieties.

Altogether there were 43 demonstration plots for this crop. The yield of gur with these canes came to about 75 to 100 maunds (6,150 lbs. to 8,200 lbs.) per acre as against 35 to 60 maunds (2,870 lbs. to 4,920 lbs.) with the kheri cane. The number of cuttings distributed was about 2 lakhs.

A new system had been introduced this year in the distribution of the cuttings. Only two to four hundred cuttings had been given to an individual cultivator with the advice that he would grow them exclusively for the purpose of propagation.

Distribution of seeds raised by the Fibre Expert and the Economic Botanist.

(*a*) *Indrasail paddy.*—During the year 130 maunds or 10,660 lbs. of the paddy seed were distributed widely to be tested against the local varieties. In almost every case there was an increased outturn with the Departmental seed, the increase generally coming up to 2 to 2½ maunds to the bigha, or 492 to 574 lbs. per acre. The seed has given uniformly good results throughout the division, the best fields, however, being in Bogra and Godagari. This year arrangements have been made to distribute 1,836 maunds or 150,552 lbs. of paddy in 5 seers (10-lb.) bags as shown below :—

	Mds.
Rangpur	550
Rajshahi	356
Bogra	620
Dinajpur	80
Pabna	50
Malda	80
Jalpaiguri	100
	1,836

(*b*) *The Fibre Expert's Kakya Bombai jute seeds.*—This jute had been tried in many places with success. In the Capsularis tracts it has given wonderful results, in some cases the increased outturn varying from 2 to 4½ maunds (164—369 lbs.) of finished fibre per acre without any extra cost Altogether 16 maunds (1,312 lbs.) of pure seeds sufficient for 100 acre. were distributed during the year under review. This year 80 maunds of this seed have been distributed in ¼-lb. bags in Bogra, 20 maunds in each of the districts of Rajshahi, Malda, Dinajpur and Jalpaiguri, 25 maunds in Pabna and 185 maunds in the Rangpur district, bringing the total distribution in the division to 370 maunds or 30,340 lbs.

Implements.—The Meston plough, the Planet Jr. handhoe, the Don and the light plough made by Messrs. Sarma & Co. of Dacca according to the specifications of Mr. R. Das Gupta have been demonstrated in many places, and cultivators are realising the superiority of these.

Sumatra tobacco.—With the excellent results obtained at the Burirhat Farm for the last few years, we are trying to introduce the cultivation of Sumatra tobacco near about the Burirhat Farm. In 1915 one cultivator grew a small plot. The tobacco was cured at the farm. This was found to be quite good and fetched a higher price than the local tobacco. In 1916 half an acre of this tobacco was grown by a few cultivators, which was cured in a shed erected by the District Agricultural Association at a cost of Rs. 400. The cultivation and curing were supervised by the District Board Agricultural Overseer and the Farm Superintendent, Burirhat ; an outturn of 400 lbs. was obtained and sold for Rs. 400. During the last season there was a great demand for the seed. Three acres of tobacco were grown round about the farm and one acre round about Domar—an important tobacco centre. Two more curing sheds have been erected, the cost being borne by the members of two co-operative societies near Burirhat. The tobacco at Domar was cured in the grower's own sheds.

Exhibitions.—The Paikor mela was attended by the District Agricultural Officer at Bogra. Working demonstration was given with sugarcane crushing mills, dones, handhoes, the Punjab plough, sprayers, chain pumps and winnowers. Samples of our improved seed, including the best varieties of sugarcane and gurs made from them, were also put up. The District Agricultural Officer prepared some rice, *muri* (parched rice), *khoee* (puffed rice) and *chira* (pressed rice) from Indrasail and exhibited them.

Seed Store.—During the year under report the following were supplied from this store :—

Paddy.	Grafts.
Potato.	Bonemeal.
Dhaincha.	Castorcake.
Arhar.	Vegetable seeds.

The statement of assets and liabilities of the seed store is enclosed.

Acknowledgment.—I am grateful to the Divisional Commissioner, the District Collectors and Subdivisional Officers for their kind help. Thanks are also due to the Inspector of Co-operative Societies and the Secretaries and Members of these. I also wish to express my thanks to Babu Bejoy Kristo Sen, Manager, Khas Mahal Estates, Khanjanpur, Babu Kishori Mohan Choudhury of Rajshahi, Babu Ashutosh Misra of Harischandrapur, Babu B. B. Ray of Rayganj, Babu A. K. Ray of Chanchal and Babu Asutosh Lahiri of Rangpur. The members of the Agricultural Association of Malda and Rangpur also rendered valuable assistance.

N. GUPTA,

Superintendent of Agriculture, Rajshahi Division.

Statement of Assets and Liabilities of the Rajshahi Divisional Seed Store for the year 1917-18.

Assets.

	Rs. A. P.	Rs. A. P.
Total amount in cash realised from sale in year under report	Nil	
Deduct outstandings of last year realised in year under report	Nil	
Cash receipts of current year		Nil.
Bills outstanding		1,309 11 3
Deduct on account of bad debts and non-realisable ...		596 2 0
Total sale-proceeds		713 9 3
Loss		2,175 6 9
		2,889 0 0

Liabilities.

Rent	357	8	0			
Deduct rent for the office of the Superintendent of Agriculture	120	0	0	237	8	0
Establishment	514	0	0			
Contingencies	525	0	0			
Depreciation on materials for storing at 5 per cent.	90	0	0	1,129	0	0
Cost of purchasing stores	...			2,200	0	0
Cost-price of stock in hand on 1st April 1917 ...	1,154	8	0			
Cost-price of stock in hand on 31st March 1918 ...	1,832	0	0			
Increase in stock	...			677	8	0
				2,889	0	0

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, CHITTAGONG DIVISION, FOR 1917-18.

I held charge of this division throughout the year assisted by a staff of ten demonstrators and also some additional men appointed temporarily for jute forecast and seed distribution (paddy and jute) work. About the latter part of the year two District Agricultural Officers were posted in this division for the districts of Tippera and Chittagong.

Tours.

2. I was on tour for 168 days and visited frequently all the demonstration centres at Fatickchari, Suabill, Hathhazari, Patiya, Mirsarai, Durgapur and Sitakunda in the district of Chittagong, Chaumohini, Sonaimuri, Ramganj, Lakhipur, Basurhat, Jagudia, Daganbhuiya, Munshirhat and Fulgazhi in the district of Noakhali and Nabinagar, Sreemuddi, Sarail, Kasba, Chandura, Birpasha, Harashpur, Ashuganj, Brahmanbaria, Barkanta, Jaffarganj, Mainamuti, Bagmara, Telpai, Laksam, Chandpur and Comilla in the district of Tippera. The items of demonstration work were the same as in previous years. More attention, however, was paid this year to the distribution of improved paddy and jute seeds raised by the Experts.

Manures.

3. (*1*) Bonemeal was used as a manure both for jute and paddy at Sreemuddi, Nabinagar, Brahmanbaria and Chandpur in the district of of Tippera, Basurhat, Magdhi and Harinarayanpur in the district of Noakhali and Fatickchari and Sitakunda in the district of Chittagong. The results were generally satisfactory except at Brahmanbaria and Nabinagar, where no definite conclusions could be arrived at one account of the prevalence of the diseases of Rhizectonia and Diplodia on jute and in the case of paddy owing to insect-pests. At Chandpur, Brahmanbaria and Deyang (Chittagong) castor cake on aus paddy gave good results with an average increased outturn of 3 maunds per acre. The use of bonemeal as a manure has become popular.

(*2*) Green manuring with dhaincha supplemented by a small quantity of bonemeal has shown good results.

(*3*) Crushed lime stone has been used with success at Durgapur and Mirsarai. A trial is being made with this manure at several places.

(*4*) The importance of Hyacinth rot and ash manure has been widely circulated and at Chandura (Brahmanbaria) the cultivators are greatly using the ash as a manure.

Distribution of seeds raised by Experts.

4. *Paddy.*—Thirty maunds of Indrasail paddy were distributed at Harinarayanpur, Kishorganj and Basurhat in Noakhali district, Brahmanbaria, Harashpur and Nabinagar in Tippera district, and Fatickchari and Sitakunda in Chittagong district. Except in a few isolated cases, where flood and weather conditions affected the crop, the yield of this was invariably found to be greater than the local varieties and the people were convinced of its superiority It is proposed to distribute 1,000 maunds of paddy next year as under :—

	mds.
Tippera	372
Noakhali	277
Chittagong	351

(*2*) *Jute.*—Towards the close of the year 81 maunds or 6,642 lbs. of Kakya Bombai jute seed in quarter pound bags have been distributed in the following centres, viz. :—Talshahar, Brahmanbaria, Akhaura, Makundapur, Harashpur, Gangasagar, Rajapur, Buriehang, Laksam, Daulatganj, Uttarda, Natherpatua, Chandina, Muradnagar, Nabinagar, Safullakandi, Daudkandi, Betgar, Chandpur and Faridganj in the district of Tippera, Harinarayanpur, Maijdi, Chaumohini, Lansirmuri, Ramganj, Raipura, Lakhipura and Feni in

the district of Noakhali. The quantity distributed was far below the demand. The produce of this would normally produce seed for 25,000 acres of jute.

A promising variety of jute was noticed at Chaumohini (Noakhali). Samples of this have been taken by Fibre Expert for study.

5. *Potatoes.*—Seed potatoes amounting to 379 maunds 34 seers or 31,928 lbs. were distributed among cultivators. The results were not uniformly good on account of the unfavourable season, but it was found that the crop could be grown advantageously. The outturn varied from 4,920 lbs. to 19,680 lbs. per acrel, the average being 7,560 lbs.

One Tipru Mog grew potatoes during the rains and obtained an outturn of 25 seers from 5 seers of seed. A similar experiment is being conducted at Fatickchari, Sreemai, Rangamati and Chittagong. If successful results are obtained this part may be converted into a seed producing agency for the plains.

6. *Groundnut.*—A quantity of groundnut seed was distributed, and the results obtained were hopeful.

Seed Store.

During the year under report the following seeds, manures and implements were sold and distributed through the agency of the Seed Store Chittagong :—

	Md.	sr.			Md.	sr.
Potato	379	24	Groundnut		3	0
Dhaincha seeds ...	13	0	Indrasail		30	0
Barshal paddy ...	12	0	Soybean		0	5
K. B. Jute seeds ...	3	0	Chilli saltpetre ...		8	22
Sunnhemp	3	20	Chain pump ...	Nos.	3	0
White teel	0	20	Hand Hoe ...	„	4	0
Cotton seeds	1	0	Meston plough ...	„	2	0
Castor cake	20	0	Bonemeal		181	0

The popularity of the seed store is increasing. The working may be more efficiently carried if the stores are started in each district where it is expected a larger volume of business may be carried on.

The statement of assets and liabilities showing the working of the seed Store will be found from the subjoined statement.

Acknowledgment.—I would avail myself of this opportunity to express my gratefulness to the local officers who rendered me a great assistance in the way of advice and co-operation. I am particularly indebted to the Subdivisional Officer, Brahmanbaria, who showed keen interest in agricultural matters.

D. DUTTA,

Superintendent of Agriculture, Chittagong Division.

Statement of assets and liabilities of Chittagong Divisional Seed Store for the year 1917-18.

Assets.

	Rs.	A.	P.	Rs.	A.	P.
Total amount in cash realised from sale in the year under report	2,947	6	0			
Deduct outstanding of last year realised in year under report	861	12	0			
Cash receipt for the current year				2,085	10	0
Bills outstanding	3,687	8	6			
Deduct outstanding bills issued before 1st April 1917	1,172	9	6			
Deduct estimated debts non-realisable ...	100	0	0			
				2,414	15	0
Total sale-proceeds				4,500	9	0
Loss				1,051	14	9
				5,546	7	9

Liabilities.

Rent	423 0 0		
Less rent for Superintendent's office ...	180 0 0		
		243	0 0
Establishment		682	0 0
Contingencies		278	10 0
Depreciation on materials for storing at 5 per cent.		25	0 0
		1,228	10 0
Packing and freight charges		283	13 3
Cost of purchasing stores		3,925	0 9
Stock in hand on 1st April 1917	1,958 4 6		
Deduct stock in hand on 31st March 1918 ...	1,843 4 9		
		114	15 9
		5,552	7 9

ANNUAL REPORT OF THE SUPERINTENDENT OF AGRICULTURE, BURDWAN DIVISION, FOR THE YEAR 1917-18.

Staff.

I obtained Babu Bhabatosh Dutt as the District Agricultural Officer of Midnapore in the latter part of April 1917. Thus the number of District Agricultural Officers in the division came to three in all. Mr. P. G. Krishnant the District Agricultural Officer of Bankura, was on leave for three months, during which period Babu Santosh Behari Bose officiated for him. In the district of Birbhum Babu Joges Chandra Roy worked as the District Agricultural Officer and made over charge to Babu Santosh Behari Bose on the 17th November 1917.

There were six Fieldmen Demonstrators in the whole division in the year. A new demonstrator has been appointed temporarily in Midnapore since October last. The Nayabasan Court of Ward's Estate and the Boinchi B. L. Mukerjee's Trust Estate in the district of Midnapore had one Fieldman Demonstrator each.

The work in the districts of Birbhum, Bankura and Midnapore is so heavy now that it is absolutely necessary to increase the number of Demonstrators to half a dozen at least in each district. So many cultivators are anxious to work in touch with us in the above three districts that we do not venture to approach many simply for want of officers.

It is very interesting to note that in the fourth year of our demonstration work in this division the number of bighas under cultivation according to our direction rose from 50 bighas in the first year to 5,000 bighas in the fourth year.

Practically in the remaining three districts of the division, namely, Burdwan, Hooghly and Howrah, we have not been able to commence work in right earnest for want of officers though many earnest cultivators are anxious to adopt our methods.

Office.

I am overworked with only one clerk to help me in both office and divisional store. The ever-increasing demand of seeds and manures cannot be met timely with the present staff.

Associations.

Howrah was the only district in the division where there was no agricultural association till last autumn, when the District Agricultural Association was first started.

The Divisional and the District Associations and also the Rampurhat Subdivisional Association helped us much to do the demonstration work among cultivators. Special mention must be made of the good work done by the

Birbhum District Agricultural Association; its work was not limited to members only; cultivators in general derived much benefit from this Association. The energetic Collector and President of the District Association helped us a great deal in all possible ways in discharging our heavy duties in the district; and at his instance the Choukidari Circle Officers at Bolpur and Sadar did their best in working among the cultivators. With the increase of the work 16 Branch Thana Associations are being formed on a popular basis. It is desirable that other District Agricultural Associations should take up work on the same lines.

The Collector and President of the Bankura District Agricultural Association is also taking keen interest in popularising the improved methods of agriculture by inviting a very large number of important agriculturists of the district as its members.

The Khasmahal Deputy Magistrate of Sadar Subdivision of Midnapore and the Managers of Nayabasan Court of Ward's Estate and Jhargram Wards' Estate helped in introducing demonstration work in the district of Midnapore, where work was only commenced in 1917.

Exhibitions and Melas.

Besides the Calcutta Food Products Exhibition, where we attended with exhibits, there were altogether six exhibitions and *melas* where we took part. The Suri and Hooghly Exhibitions were the most noteworthy ones. The well-established Suri Exhibition got a few new items of agricultural work this year. More than 50 charts of important and valuable informations prepared by the Deputy Director of Agriculture, Western Circle, and 80 precious mottos of old sayings on agriculture by Mr. P. C. Seth of Calcutta were added to our store of exhibits. The District Agricultural Officer of Birbhum—actually showed the process of cultivation of groundnut, sugarcane and potato to thousands of cultivators by growing the crops in the exhibition ground. He also gave a new, simple and interesting demonstration of extracting oil from groundnut; this machinery is generally used for extracting oil from mahua by Sonthals. It was actually experienced that within two weeks of the exhibition three such machines were manufactured and planted by the District Agricultural Officer in three centres, and that no cultivator was, therefore, willing to dispose of his groundnut for seed purposes even, and consequently the seeds for sowing in this season are to be supplied from outside. This solves the problem of utilising the crop in the district itself.

As in other years various demonstrations and lantern lectures were the principal wonk of the Department. Leaflets and pamphlets were distributed.

It is very gratifying to note that the Director of Agriculture attended the exhibition for two days and come in direct touch with many local people taking interest in agriculture. He also took part in an agricultural mass meeting convened by the District Agricultural Association.

The Hooghly Exhibition also did splendid work this year. The departmental stall was the biggest of its kind generally arranged for exhibitions. The people have already commenced to take interest in agriculture. The Collector and the Sadar Subdivisional Officer did their best to make it a success. This exhibition will, I hope, gradually turn to be as educative as the Suri Exhibition is.

The other four *melas* were at Margram, Raipur, Nanoor and Muraroi in the district of Birbhum, where agricultural arrangements were made on a small scale.

Hetampur did not hold a *mela* this year.

Demonstration work.

I was out on tour for 214 days in the year under report in all the districts of the division and the District Agricultural Officers of Midnapore, Bankura and Birbhum were out in their respective districts for 222, 192 and 196 days, respectively.

The demonstrations carried out in various districts were mainly :—

1. Aman paddy with—

(*a*) Bonemeal,
(*b*) Green manure dhaincha,
(*c*) Castorcake.
(*d*) Conserved cowdung.

(*a*) Aman paddy was grown in 1,500 bighas with one maund of bonemeal per bigha. The result was almost everywhere very satisfactory, and the increase due to the application of this valuable manure was from 5 maunds to 16 maunds per acre. It is so much appreciated by the cultivators of Birbhum that indents have already reached for nearly 1,400 maunds from that district alone for cultivation of aman paddy in 1918.

(*b*) Dhaincha was grown for green-manuring on more than 1,000 bighas ; as the rains set in comparatively at an earlier date last year the plants could not grow to the proper height during the short time. But still the result on the whole was satisfactory ; the increase of outturn per acre with this manure was 3 to 10 maunds.

The results of demonstration with bonemeal and dhaincha green manure on aman paddy are published below in chart form by the Deputy Director of Agriculture, Western Circle, for information of the public.

(*c*) *Castorcake.*—It is commonly used for potato cultivation ; but nowadays castorcake is also being used in paddy land here and there in the division. In many places of Burdwan and Hooghly districts petty merchants start depots of castorcake in important seasons of the year.

(*d*) *Conserved cowdung.*—Number of pits for conserving cowdung is very rapidly increasing in this division ; the cultivators have undoubtedly commenced to appreciate the value of such preserved cowdung.

2. *Introduction of Groundnut.*—The cultivation of groundnut was first introduced in this division in 1915. During this short period it has gained such popularity that the area under cultivation in the districts of Birbhum, Bankura and Midnapore was in the year under report not less than 1,500 bighas. It is a good sign that high waste land which was so long considered to be of no use is being taken on lease by peasants mainly for the cultivation of groundnut. The results of our work in important centres are published in chart form.

3. *Foreign varieties of Sugarcane.*—Red Mauritius, M. Tanna, Barbados—Gandari and Vendamukhi were introduced in the districts of Bankura, Birbhum, Burdwan and Hooghly. Everywhere the results specially of the first three varieties were very good. The demand for cuttings of these varieties was so great this year that we could meet only one-third of the cultivators' demand in this division from Chinsura and Burdwan farms. We were able to supply only 53,000 cuttings this year.

4. *Indrasail Paddy.*—I received 32 maunds of seeds of Indrasail paddy from Dacca and distributed them among a few selected cultivators of all the districts of the division except Howrah. This was the first year of its cultivation in this division. It gave satisfactory yields in almost all low lands, but the result was not good in the high land. The rains were comparatively heavier and earlier than the normal, and therefore the season was somewhat favourable to Indrasail. Further tests will be made this year.

Babu Aghore Nath Banerjee cultivates more than a thousand bighas at Nadia in the district of Burdwan. He took one maund of Indrasail seed and grew in 15 bighas. He submits the following report :—"Regarding the produce of Indrasail paddy grown by me this year I have the honour to report that the average yield of this kind of paddy was 15 maunds per bigha, whereas the yield of other kinds of paddy on the surrounding lands was 12 maunds per bigha. In this connection I would like to note that were it not for the great damage done by insects, the yield of the Indrasail paddy in this part would have been far greater."

5. *Potato.*—Hooghly district has the largest cultivation of potatoes in the Province. In the districts of Birbhum, Bankura and Midnapore its cultivation was almost unknown a few years ago. Now potato cultivation

is very rapidly extending. In many places Darjeeling and Nainital varieties was introduced and the result was quite satisfactory.

6. Other crops introduced are C. P. fine aus, Rangpur tobacco, Pusa wheat, Raipur mustard, Comilla arhar, Patnai gram and Ceylon papaya.

7. Implements introduced are Don and chain pump for irrigation, and Planet Junior hand hoe and Meston plough for tillage.

8. *Seed Selection.*—As there are only a few demonstrators in the whole division, selection of seed could not be taken in hand everywhere. The seed selection of paddy and jute was done at Mahisadal and Kalna centres only.

Store.

The list of seeds and manures supplied during the year are given below :—

	lbs.
I. The total quantity of seeds supplied is 275 maunds 8 seers and 8 chataks, *i.e.*	22,467
Out of this—	
(*a*) Dhaincha seed	4,727
(*b*) Groundnut „	5,125
(*c*) Paddy	3,559
(*d*) Miscellaneous	9,056
(A) Sugarcane cuttings of foreign varieties	53,000 Nos.

The quantity of groundnut and dhaincha seed supplied during the year was not as big as it had been in the previous year; the reason is that the locally grown dhaincha and groundnut were utilised for seed purpose.

	lbs.
II. The total quantity of manures supplied is 1,064 maunds and 15 seers, *i.e.*	157,306
Out of this—	
(*a*) Boneméal	130,216
(*b*) Castorcake	21,484
(*c*) Miscellaneous	5,606

III. The number of implements supplied is 8 only.

The cost price of the stock in hand on 1st April 1917—

	Rs.	A.	P.
(*a*) Seeds	257	14	6
(*b*) Manures	96	7	3
(*c*) Implements	152	0	0
Total ...	506	5	9

The cost price of the stock in hand on 31st March 1918—

(*a*) Seeds	680	11	0
(*b*) Manures	186	10	0
(*c*) Implements	196	0	0
Total ...	1,063	5	0

Receipts during the year—

(*a*) Seeds	1,396	9	6
(*b*) Manures	1,046	9	9
(*c*) Implements	46	13	0
(*d*) Miscellaneous	0	9	0
Total ...	2,490	9	3

Expenditure during the year—

(*a*) Seeds	1,367	4	6
(*b*) Manures	791	5	10
(*c*) Implements	136	8	0
(*d*) Office contingencies	485	12	0
Total ...	2,780	14	4

	Rs.
Demonstration grant for groundnut seed	250
House rent	840
Divisional staff and Superintendent's office contingencies ...	500

Special work.

The jute forecast work was done by me with the help of the District Agricultural Officer and 13 temporary clerks engaged for four months.

J. N. SARKAR,

Superintendent of Agriculture, Burdwan Division.

REPORT OF THE SUPERINTENDENT OF AGRICULTURE, PRESIDENCY DIVISION, FOR THE YEAR 1917-18.

During the year under review, *i.e.*, from July 1917 to March 1918, I spent altogether 125 days on tour, out of which 11 days were spent outside this division and 114 days within my jurisdiction in connection with :—

(*a*) Jute forecast work.
(*b*) Demonstration work.
(*c*) Attending meetings of the Agricultural Association.
(*d*) Attending exhibitions.
(*e*) Seed selection work.

The number of days I was on tour in each district are shown below :—

	Days.	
Murshidabad	43	
24-Parganas	35	
Nadia	22	
Jessore	13	
Khulna	1	
Outside the division	11	
Total ...	125	days (in 9 months).

During these months the staff under me was :—

(1) One seed store clerk.
(2) One District Agricultural Officer, Babu Sachindra Krishna Dutt.
(3) Seven Demonstrators sanctioned by Government and two Demonstrators appointed by the Court of Wards' Estate, one by the Jaunbazar Ward's Estate and another by the Gobardanga Ward's Estate.
(4) For jute forecast work 19 temporary men worked under me for four months from the 15th May to 14th September 1917.

During the year 1917-18, three different persons worked as the seed store clerk. This caused great inconvenience in the management of the seed store as well as in the office work, as it absorbed much of my time to train up these men, more particularly as the work expanded to a considerable extent.

Jute forecast work.

The work was done as in the previous years. Cultivators and panchayets now understand the object of the work clearly and any intentional mistake is now unlikely.

Seed Store.

During the past year the seed store for the Presidency Division continued to be, as in the previous years, at 27, Upper Circular Road, close to the Sealdah Railway Station.

During the last year the number of visitors, belonging to almost every district of Bengal, increased considerably, and among them there was a fair proportion of actual cultivators.

Actual supply of seeds and manures during 1917-18 from this Seed Store :—

	Mds. sr.	Ton cwt. lbs.
Seeds—		
Indrasail paddy (*Oriza sativa*)	67 20	2 10 0
Other varieties of aman paddy	7 35	0 5 84
Kataktara aus paddy for the work of 1918-19 ...	36 0	1 6 40
Other varieties of aus paddy	2 0	0 1 52
Groundnuts (*Arachis hypogea*)	9 0	0 6 66
Rahar (*Cajanus ndieus*)	1 19	0 1 9
Dhaincha (*Sesbania aculeata*)	17 31	0 13 0
Jute seed (*Corchorus capsularis*, and *c. olitorius*) for the work of 1917-18	18 0	0 13 20
Jute seed for the work of 1918-19	12 0	0 8 18
Potato (*Solanum tuberessum*) (Darjeeling) ...	163 30	5 19 98
Nanital	25 20	0 18 74
Papya seed (*Carica papya*)	...	...
Sugarcane (*Saccharum officinarum*) cuttings ...	22,259 cuttings.	
Manures—		
Castorcake	464 20	17 0 8
Bonemeal	30 20	1 2 36
Super phosphate	9 30	1 7 14
Sulphate of ammonia	8 0	0 5 96
Sulphate of potash	3 30	0 2 82
Implements—		
Iron don	1 piece.	

Supply through Co-operative Credit Societies.

During the year under review 154 maunds 10 seers of castorcake, 4 maunds 20 seers of super phosphate, 1 maund 30 seers of sulphate of potash, 1 maund of dhanicha seed, 6 maunds of Kataktara aus paddy and 37 maunds 20 seers of potato were supplied through Co-operative Credit Societies. More elaborate arrangements have been made for demonstration of Indrasail paddy and R. 26 jute in the coming year. Demand for manure from the members seems to be increasing.

Supply of seed and manures by the District Boards.

The District Board of 24-Parganas advanced Rs. 1,000 last year for supplying seed potatoes and manures to cultivators for potato cultivation.

Supply of seeds and manures by the Agricultural Associations.

The Agricultural Association of 24-Parganas advanced Rs. 240 and that of Jessore advanced Rs. 400 for supplying seed potatoes and castorcake to the cultivators of those districts.

Supply of seeds and manures by the Court of Wards' Estates.

The Court of Wards' Estates of Jaunbazar and Gobordanga supplied seeds and manures to the cultivators in those estates for the demonstration work.

Dhaincha (*Sesbania aculeata*) *greenmanuring.*—Last year we got an extra outturn of 80 to 120 lbs., *i.e.*, 1 maund to 1½ maunds of extra outturn from aman paddy by greenmanuring the fields.

Selected seeds.

Kakya Bombai Jute (*selected C. Capsularis*).—The Fibre Expert's selected Kakya Bombai jute gave satisfactory results last year in Mograhat, Diamond Harbour subdivision, where it yielded 1 maund more of fibre than that of the local *Olitorius* seeds on two plots.

Name of person.	Area of demon plot.	Area of check plot.	Outturn of K. B. jute.	Outturn of kajla jute.
			Mds. sr.	Mds. sr.
Nilmani Sardar ..	1 Bigha	1 Bigha	6 30	5 30
Ditto ...	1 „	1 „	4 10	3 0

Indrasail Paddy (*selected Oriza sativa*).—Sixty-seven and a half maunds of the Economic Botanist's selected Indrasail paddy were distributed last year all over this division. There were about 400 plots in 30 centres which covered 12 subdivisions.

The mean outturn of Indrasail, however, in majority of the centres was higher than that of the local varieties grown on the check plots in each place. This will be seen from the table below :—

Name of the place.	Number of plots.	Area in bigha.	Total yield of Indrasail.	Total yield of local paddy.
			Mds. sr.	Mds. sr.
Bthuadahari ...	6	6	42 11	37 30
Bongong	12	12	89 9	84 0
Naihati	9	9	78 22	70 0
Basirhat	11	11	91 10	85 10
Baraset	9	9	112 30	110 20
Habra	12	12	107 20	109 0

* Less though four plots yielded more.

The only place where it has been definitely found to be unsuitable is the brackish tract in the south and south-east of the 24-Parganas district.

For demonstration of Indrasail paddy more elaborately in the coming year arrangements have been made to distribute 100 maunds of fresh seed this year over and above the seed of the last year.

Kataktara aus paddy.—Thirty-six maunds of Economic Botanist's selected Kataktara aus paddy have been distributed in this division for demonstration in 1918.

Introduction of more profitable new crops and better varieties of existing crops.

Potato.—Last year was not a favourable year for a potato crop. The untimely rains interfered with the germination of seeds; and potato blight appeared afterwards in many places. In four places, however (Jamalpur, Ghosepur, Berhampur and Bethudahari), the result was very satisfactory, the yield being from 2½ to 3 tons per bigha, *i.e.*, 7½ to 9 tons per acre, from the Darjeeling variety, and 1½ to 2 tons per bigha, *i.e.*, 4½ to 6 tons per acre, from Gauhati potatoes.

Groundnuts.—Attempts were made to grow groundnuts near Mograhat, Bongong, Ranaghat, Chuadanga, Krishnagar, Bathuadahari and Berhampur. Excepting at Berhampur and Magrahat, where the yield were 5½ and 6 maunds, respectively, everywhere the crop was damaged by hairy caterpillar and the yield was very low.

Papya.—Success of Bangalore papya was reported from Jamalpur, Chuadanga, Ranaghat, Bethuadahari and Berhampur.

Thick varieties of Sugarcane—Were reported to be successful wherever they were sent.

Agricultural Associations.

There is an association in each district, but only the 24-Parganas was provided with a District Agricultural Officer. Accordingly good work was done in this district. The remaining Associations were keen, but owing to want of supervision did not make any progress. A Second District Agricultural Officer has recently been appointed and placed in charge of Nadia and Murshidabad. Each district requires a District Agricultural Officer. The present work in hand cannot be properly carried out and controlled without this minimum staff.

Agricultural Exhibitions.

There was one agricultural exhibition last year in the district of Murshidabad at Banjetia. Departmental exhibits were shown and lectures and demonstrations were given by my staff.

There were two other exhibitions held at Calcutta last year—

(1) Food Products Exhibition, where all food crops commonly grown in this division with their products were shown.

(2) The Social Service Exhibition. Importance of agriculture in the economic development of the community was explained by means of charts and lectures.

Financial Statement of the Seed-Store, Presidency Division, for the year 1917-18.

Receipts—	Rs.	A.	P.
Receipts on account of seeds, manure, etc. supplied in 1917-18.	604	7	0
Receipt on account of outstanding of previous year ...	1,038	13	0
Total ...	1,643	4	0

Outstanding.—

Bills outstanding for the supply in 1917-18	...	1,571	8 6

Stock in hand—

Cost price of stock in hand on 31st March 1918	...	708	14 0

Expenditure—

Cost of purchasing seeds		799	15 6
Ditto manures		1,556	15 9
Ditto implements		54	0 0
Total purchase of stock	...	2,410	15 3
Packing and freight charges		205	11 6
Contingent charges for seeds, manures, etc.		105	7 6
Total expenditure incurred on account of seeds, manures, etc.		2,722	2 3
House rent		840	0 0
Office contingencies		357	0 3

H. P. MITRA,

Superintendent of Agriculture, Presidency Division.

ANNUAL REPORT OF THE DACCA CENTRAL FARM FOR 1917-18.

Introduction.—The farm is situated 5 miles north of the Dacca Railway station near the village of Manipur.

The total area of the farm is 353·7 acres, of which 215 acres are under cultivation, the rest being under buildings, roads and pasture. The soil may be classed under the following groups :—

High land.
Intermediate land.
Ravine or low land.

The soil of the farm is generally hard and is typical of a large tract including the Madhupur jungles. Manuring is therefore essential to the production of good crops. The lower lands are suitable for transplanted paddy.

Laying out of plots.—During the year a start was made with satisfactory progress to lay out the farm properly. Many roads have been reconstructed, drains dug and ravines, which were very irregular in shape before, have been laid out into rectangular plots in one-tenth of an acre plots or in multiples thereof. The high lands have been converted into shapely blocks and their sides shaped properly. North Mirpur is almost complete and will afford room for experimental work next year.

For the use of the Economic Botanist a series of contiguous plots have been laid out in tenths of an acre, grading up from a level fit for growing deep water paddies to one high enough for the high land aus. This will enable us to conduct experiments with any variety now whatever may be the depth of water required for its growth.

Attempts are being made to lay out the farm in regular blocks for experimental purposes and improving the general appearance ; on the whole

there has been some marked improvements. Laying out operations will be continued and probably completed next year.

Rainfall.—The rainfall from February 1917 to January 1918 is inserted below. The season was too dry for early aus. The rainfall in September and October was useful to transplanted paddy.

Month.	Normal		Actual.	
	Rainfall in inches.	Days.	Rainfall. in inches.	Days.
1917.				
February	1·91	5	1·12	1·8
March	...	...	2·59	3·5
April	4·63	10	4·00	6·7
May	1·91	11	9·60	11·3
June	7·74	19	13·38	15·2
July	20·32	27	12·85	17·75
August	8·64	20	12·53	17·40
September	12·08	16	9·43	11·70
October	4·91	5	...	...
November	...	...	...	...
December	...	...	...	...
1918.				
January	...	...	...	...

Temperature.—The maximum and minimum temperatures as recorded in the farm are shown below :—

Month.	Outside.		Inside.	
	Maximum.	Minimum.	Maximum.	Minimum.
1917.				
February	104	52	100	54
March	112	58	112	58
April	112	68	111	70
May	114	72	112	74
June	112	78	112	72
July	94	72	96	78
August	96	74	98	78
September	100	74	98	78
October	98	72	98	72
November	96	60	94	60
December	90	54	90	50
1918.				
January	88	50	80	48

Experiments.—The major portion of the field work at this Farm consists in collaborating with the Experts in experiments which are described in the respective reports.

Fodder.—About 18 acres were grown under joar and a good crop was obtained. Green stalks were ensilaged in underground pits and the resulting staff was very satisfactory.

Implements.—The following implements were used in the farm :—Punjab plough, S. T. Harrow, Corn crusher, Threshing machine, Winnowers, Disc Harrow, Planet Junior hand hoe. Among these the Punjab plough, S. T. Harrow and Planet Junior hand hoe can well be recommended to cultivators.

Cattle.—The general condition of cattle was good. Eight animals showed signs of foot and mouth disease, but all recovered. Fourteen bullocks were purchased during the year bringing the total to 80.

During the year under report three apprentices and 20 cultivators have been trained in the farm.

Receipts and expenditure.—The total receipts up to 31st March 1918 were Rs. 3,222-6-9 The total expenditure during the year under report was Rs. 53,396 (including experimental and capital charges—construction of new quarters for clerks and laying out and reclamation).

Visits.—The farm was visited by His Excellency the Governor of Bengal, the Hon'ble Sir H. Wheeler, the Hon'ble Mr. J. G. Cumming, Mr. L. Birley, the Revenue Secretary, the Commissioner of Dacca Division and other high officials of Government. The Imperial Mycologist came here twice and the Collector of Dacca paid frequent visits.

Staff.—During the year under report Babu Sujyoti Nath Chatterjee was in charge of the farm. He took privilege leave from 25th February 1918, and Babu Santi Prasad Sen Gupta, District Agricultural Officer, Dacca, was put in charge in addition to his own duties. The Superintendent was assisted by a staff of three overseers and two clerks.

Farm Seed Store.—This is mainly meant for the storage and supply of seeds grown under the supervision of the Experts. There is an overseer in charge. The stock of the year under report is shown below :—

Kataktara aus paddy—177 maunds or about 14,514 lbs.
Indrasail transplanted winter paddy—990 maunds or about 81,180 lbs.

R. DAS GUPTA,
Offg. Deputy Director of Agriculture, Eastern Circle.

ANNUAL REPORT OF RAJSHAHI FARM FOR THE YEAR 1917-18.

Situation and brief history.

The Rajshahi experimental station is situated on the outskirts of the town of Rampur-Boalia in the district of Rajshahi.

The total area is 63 acres, of which 50 acres are under cultivation, the rest being under roads, buildings, tanks, etc.

The farm was started in July 1904. The land was acquired by the Rajshahi Association and made over to Government for the purpose of starting a farm.

The shape of the farm is rather oblong divided into 4 rectangular blocks by 2 cross roads. A road has also been made along the boundaries of the farm.

There were 89 mango trees already existing, and during the year under report 100 cocoanut palms, 5 mango grafts, 4 plums, 4 Nagpur oranges, 10 cuastard apple and 4 lime grafts have been planted.

About one-third of the farm area is low land well suited for rice and jute. The remainder consists of high land suitable for sugarcane, high land jute, aus paddy and rabi crops generally. A large number of experimental plots have been laid out for testing the evenness of the soil.

The soil of the farm is rich in lime but poor in potash, phosphate and organic matter as will be seen from the following analysis:—

Salica	77·90
Ferric oxide	4·56
Alumina	6·15
Lime	3·29
Magnesia	1·37
Potash	0·65
Soda	0·21
Phospheric acid	0·11
Sulpharic acid	0·03
Carbonic acid	2·34
Organic and combined matter ...	3·39
	100·00

As regards buildings the farm is now fully equipped. A poultry yard and a pucca threshing floor have also been made.

Rainfall.—The following table indicate the actual rainfall in comparison with the normal :—

Month.	Actual.		Normal.	
	Rainfall.	Number of rainy days.	Rainfall.	Number of rainy days.
April 1917 ...	2·30	1	1·81	2·9
May „ ...	6·76	9	5·56	7·7
June „ ...	7·95	19	10·81	12·6
July „ ...	9·17	27	11·45	15·1
August „ ...	5·58	21	10·75	14·7
September „ ...	12·12	20	10·40	12·4
October „ ...	15·15	9	4·46	4·9
November „ ...	Nil	Nil	0·31	0·6
December „ ...	Nil	Nil	0·06	0·2
January 1918 ...	Nil	Nil	0·34	0·8
February „ ...	Nil	Nil	0·84	1·3
March „ ...	0·11	3	1·15	1·6
	59·14	89	57·94	74·8

From the above it will be seen that the season was very favourable in its early stages for sugarcane, jute and aus paddy, but insufficient rainfall in July and August delayed transplanting of the aman paddy. Heavy showers in September and October accompanied by strong winds were injurious to paddy and sugarcane. Absence of rainfall from November to February was also harmful to the rabi crops.

The programme of work undertaken included—

(1) Varietal tests with—
  (*a*) Sugarcane (*Sacharum officinarum*).
  (*b*) Jute (*Corchorus capsularis and olitorious*).

(2) Seed production—
  (*a*) Jute.
  (*b*) Aman paddy,

(3) Manurial experiments with jute.

(4) Comparative trials of I. O. P. oilcake and castorcake.

(5) Rabi crop including potatoes.

(1) (*a*) *Sugarcane.*—The crops, generally the soft varieties in particular, suffered much from high winds and heavy rains.

Area.	Varieties.	Weight of canes.	Weight of juice.	Weight of gur.	Per acre.	Remarks.
		Mds. sr. ch.	Mds. sr. ch.	Mds. sr. ch.	Mds. sr. ch.	
1/10 acre	Dacca Gandari ...	43 17 0 or 3 544 lbs.	.....	5 9 13 or 430 lbs.	52 18 2 or 4,301 lbs.	Blown down and greater portion damaged by wild animals.
Do. ...	Vendamukhi ...	93 0 4 or 7,626 lbs.	79 10 12 or 6,400 lbs.	10 27 1 or 855 lbs.	106 30 10 or 8,755 lbs.	Blown down and portion damaged by wild animals.
Do. ...	Yellow Tanna ...	120 32 4 or 9,906 lbs.	82 32 12 or 7,691 lbs.	14 7 14 or 1 164 lbs.	141 38 12 or 11,612 lbs.	Stood.
Do. ...	Striped Tanna ...	108 16 6 or 8,989 lbs.	72 34 6 or 5,954 lbs.	13 10 6 or 1,087 lbs.	132 23 12 or 10,872 lbs.	Do.
Do. ...	B. 147 ...	74 26 12 or 6,123 lbs.	52 26 2 or 4,327 lbs.	9 33 1 or 805 lbs.	93 10 10 or 8,058 lbs.	Blown down.

Jackals and wild-boars caused serious damage to Gandari, Vendamukhi and B. 147 plots. The Tannas, however, were not attacked perhaps on account of their toughness. The Tanna grows very well in this farm and is much liked by the people in places where pigs and jackals abound. The Dacca Gandari is the best chewing cane.

Apart from the experimental cultivation there were 4½ acres of canes of different varieties for propagation of seeds. As in previous years the crop has been found to be profitable as will be seen from the details below :—

Receipts—

	Rs.
Outturn of gur, 330 maunds at Rs. 5-8	1,815
140,000 cuttings at Rs. 4 per thousand	560
By sale of chewing canes	58
	2,433
Deduct—Cost of cultivation	750
	1,683

This leaves a net profit of Rs. 336 per acre or Rs. 112 per bigha. It may be mentioned here that about 1⅓ acres were actually damaged by jackals and wild boars, while the entire plantation was blown down by storms about the end of October. If the whole crop were intact the profit would have been bigger.

Fibre Expert's experiments.

(*b*) *Jute*—(1) *Variety.*—Since 1917 the varietal experiments have been conducted by the Fibre Expert for selection of good seeds out of the farm Tosha (*Corchorus olitorious*).

The selected seeds of olitorious varieties marked R. 26, R. 20, R. 30, D. C. O., Dhalabadan and of capsularis marked R. 85 were grown side by

side, and R. 26 has been found to be the best. The results are tabulated below :—

Plot No.	Area.	Name and number of the varieties.	Actual outturn of fibre.	Outturn weight of green crops.	Outturn weight of fibre.	Weight of green stalks per acre.	Remarks.
			Mds. sr. ch.	Mds. sr. ch.	Mds. sr. ch.	Mds. sr. ch.	
1, 3, 5, 7, 9, 11, 13, 15, 17, 19.	0·5	R. 30 ...	13 28 11 or 1,123 lbs.	239 33 10 or 11,605 lbs.	27 17 6 or 2,249 lbs.	479 27 4 or 39,333 lbs.	The percentage of fibre of Dhalabadan to its green stalks is more than other varieties.
6, 8 ...	0·1	R. 26 ...	2 37 6 or 240 lbs.	55 12 6 or 4,336 lbs.	29 13 12 or 2,405 lbs.	553 3 12 or 45,353 lbs.	
10, 12 ...	0·1	R. 15 ...	2 31 1 or 227 lbs.	48 39 0 or 4,016 lbs.	27 30 10 or 2,277 lbs	489 30 0 or 40,169 lbs.	
14, 16 ...	0·1	Dhalabadan	2 34 13 or 235 lbs	44 16 8 or 3,641 lbs.	28 28 2 or 2,353 lbs.	444 5 0 or 36,418 lbs.	
18, 20 ...	0·1	D. C. O. ...	2 21 12 or 208 lbs.	45 6 10 or 3,785 lbs.	25 17 8 or 2,085 lbs.	451 26 4 or 37,035 lbs.	
2, 4 ...	0·1	R. 85 or Kakya Bombai	2 12 13 or 186 lbs.	41 13 8 or 3,387 lbs.	23 8 2 or 3,389 lbs.	418 7 0 or 34,290 lbs.	

(2) *Seed production*—(*a*) *Jute.*—About 3⅓ acres of land were divided into two equal portions and were grown under Nos. R. 30 and R. 26 for seed production. Both the varieties grew well and gave an outturn of 897 lbs. of good seeds (R. 26 produced 522 lbs. of seed and R. 30 produced 375 lbs.). After the collection of seed the dry stalks were weighed and burnt into ashes. Stalks from R. 30 weighing 144 maunds gave 5 maunds 23 seers of ash and 202 maunds of R. 26 gave 7 maunds 3 seers ash. The potash content of these ashes is about 23 per cent. These will be utilised for manuring the next crop of jute.

(*b*) *Aman paddy—Indrasail paddy* (*Oryza sativa*).—Economic Botanist's Indrasail Dacca No. 1 were grown on 17⅓ acres of low land for producing pure seeds. The total yield of seed came to 25,666 lbs. The outturn, though not up to expectation due to bad season and late transplanting, was better than average local outturn.

3. *Manurial experiments with jute.*—To study the effect of potash manure as a check against the attack of Rhizoctonia the Fibre Expert has started a series of experiments with concentrated potash salt such as potassium sulphate, nitrate and chloride. The results are now being observed and will be published later on.

4. *Comparative trials of I. O. P. oilcake and castorcake.*—Castorcake gave better results on potatoes, while I. O. P. cake on transplanted paddy.

5. *Rabi crops: Wheat* (*Triticum sativum*).—Pusa wheat No. 12 has been tried on the farm for the last three years. During the years under review the season was very unfavourable, only 68 maunds having been obtained from 9⅓ acres of land.

Khesari (*Lathyrus sativus*).—Khesari grew itself (out of last year's seed grains all over the transplanted paddy fields measuring 37 bighas. Twenty bighas of the crop was sold to the goalas as green fodder for Rs. 60, and the rest was given to the farm bullocks.

Gram (*Cicar arietum*).—The crop was grown on 2 acres and 2,460 lbs. of grain were obtained.

Oats (*Avena sativa*).—The crop was grown on 11 bighas of land. Three and a half bighas of the crop was harvested with an outturn of 752 lbs. of grain, the rest given to cattle.

Jowar ( ).—$2\frac{2}{3}$ acres of jowar were grown for fodder.

Dhaincha (*Sasbania aculeata*) was grown on an area of $3\frac{1}{3}$ acres ; greater portion of the crop was ploughed in for green-manuring paddy and sugarcane fields and little over a bigha was allowed to seed. The outturn of seed was 274 lbs.

Potatoes (*Solamum tuberasum*).—Potatoes were grown without irrigation on a very small scale for training of the apprentices. The result was fair with an outturn of about 100 maunds per acre.

Several varieties of English and country vegetables were grown on a piece of land measuring two-fifth of an acre with good results.

Seed supply.—24,600 lbs. Indrasil paddy and 1,054 lbs. of jute seed have been supplied for distribution.

Poultry.—There are some hens and cocks of pure Buff Langshang breed ; the villagers round the farm are very anxious to rear the birds for breeding. The crossbred hen is found to be a better layer and sitter than the pure bred.

Implements.—There is a full stock of country implements. Planet Jr. hand hoe and bullock hoes are very useful and liked by the people. The spring tooth harrow will be tried next year.

Training of apprentices.—One paid and two unpaid apprentices were trained on the farm.

Receipts and Expenditure.

	Rs.	A.	P.
Receipts—			
Sale-proceeds of crops remitted to treasury by 31st March 1918	3,423	5	3
Bills receivable	511	14	6
Valuation of stock in hand	1,496	11	9
Total ...	5,431	15	6

Expenditure.

Capital—			
Construction of office building and purchase of bullocks	851	9	9
Ordinary recurring expenditure—			
Feed of cattle	634	2	0
Purchase of seeds, manures and implements ...	449	11	3
Wages of labourers	3,140	11	9
Railway and steamer freight	27	8	6
Cooly and cart hire	21	1	0
Service postage stamps and telegrams	37	8	6
Purchase and repair of furniture	50	0	0
Miscellaneous contingencies	373	12	6
Total ...	4,734	7	6

Visits.—The Director of Agriculture and the Fibre Expert visited the farm once during the year and the Deputy Director of Agriculture visited several times. The Deputy Director of Agriculture Western Circle, with the Superintendents of Agriculture, Presidency and Burdwan Divisions, visited the farm once also to see the olitorius jute crop. The Members of the University Commission and Sir Nilratan Sirkar visited the farm during their tour in Rajshahi Division.

R. DAS GUPTA,

Offg. Deputy Director of Agriculture, Eastern Circle.

ANNUAL REPORT OF THE RANGPUR CATTLE FARM FOR 1917-18.

Site, description and area.—The farm is situated very close to the railway station, on both sides of the railway line, about three miles from the town.

The farm has an area of 332 acres, consisting of 249 acres of high land and 66 acres of low land fit for aman paddy and about 17 acres of bhil (which dries up in the winter) fit for growing deep-water aman paddy.

All the high land practically belongs to one type. The soil is a light sandy loam and appears to be deficient in lime. With the exception of about 50 bighas which is rather sandy, the high land is mostly suitable for the cultivation of jute, sugarcane, potato and tobacco.

Reclamation.—Reclamation has been continued and a substantial area has lately been brought under cultivation. The most important work under this head has been the levelling and relaying of plots for systematic experiments.

The farm now consists of the following area :—

	Acres.
Under cultivation	200
Bamboo groves	5
Roads, drains, etc.	13
Farmstead and paddock	14
Tanks, thatching grass, pasture and un-reclaimed ...	100
Total ...	332

The policy enunciated in the last annual report has now been given effect to. In accordance with this policy the farm will be conducted as an experimental one as regards cattle-breeding and as a fodder farm for the production of food for the cattle, but questions relating to the improvement of fodder crop will also be studied.

With reference to breeds, it has been decided that the farm should use indigenous cows of one type as the basis of experimental work and two classes of bulls, local and imported, the latter being selected animals of a milking type of Hansi cattle. There will thus be two distinct herds, the indigenous and cross-bred.

Seventy-one cows have been purchased during the year under report, and a Pedigree Hansi bull obtained from the Cownpore Military Dairy Farm. These added to the old farm stock now bring up the herd to ninety-nine. They have been divided into two herds, one going with the Pedigree Hansi bull. and the other with a farm-bred country bull. The herds are grazed and kept separately. It is hoped that some definite results will be produced during the next few years.

The task of securing animals of a definite type proved, however, a very difficult one as it was practically found that there was hardly any place where even two similar animals could be had. In most places even the best animals did not fulfil our minimum requirements. The cows were purchased from the following places :—

Calcutta ...	... 5	Suri ...	... 7
Malda ...	... 9	Dacca ...	... 8
Pabna ...	... 29	Rangpur ...	... 9
Rajshahi ...	... 4		

More accommodation will be needed soon, specially in view of the fact that some heifers will shortly come into calf, and arangements are being made for that.

Yield of milk.—The system of milking has been somewhat modified. The calves are now allowed two teats full. and until the calves have passed 6 months the cows are milked only in the morning, the calves being allowed to go with their mother the whole day.

The following table shows the average daily yield of milk per cow in pounds.

1917.		1917.	
April	4·3	October	2·1
May	4·4	November	2·2
June	4·8	December	2·6
July	4·1	January	3·0
August	4·4	February	3·3
September	2·5	March	2·8

The system of milking only t wo teats was introduced from September.

Disease and casualties.—The herd was free from any serious disease throughout the year.

The following were the number of animals at the farm on the 31st March 1918.

Cows			99
Calves (suckling)—			
Male	16		
Female... ...	51		
			67
Young stock 1 year and above.			
Male	2		
Female ...	16		
			18
Bullocks	62		(including 3 newly castrated).
Bulls			7 (including 4 young).
Total ...			253

Crops.—Rainfall statistics are as follows :—

Months.	Actual.		Normal.	
	Rainfall	Rainy days.	Rainfall.	Rainy days.
1917.				
July	10·89	15	15·89	15·0
August	3·81	11	12·80	13·7
September	3·98	5	14·24	13·3
October	31·35	7	4·87	4·0
November	Nil	Nil	0·12	0·2
December	,,	,,	0·05	0·2
1918.				
January	Nil	Nil	0·50	0·9
February	,,	,,	0·54	1·2
March	,,	,,	1·25	1·8

Owing to deficiency of rainfall in August and September very little transplanting could be done. The heavy rains in October, on the other hand, retarded rabi sowing.

The farm is now mainly under fodder crops, chiefly maize and jowar which will be followed by oats and peas in the winter. During the year under report 50 acres of land were under maize and jowar and 70 acres under oats and peas.

Several varieties of jowar and maize have been procured and are being tested this year. A pucca silo has been built this year. The silo has been recently opened and the fodder appears to have kept good condition. Some jowar was also kept in a small pit silo which has been eaten greedily by he animals.

Two small plots of Barseem and Lucerne were sown. In one cutting the Barseem gave 39 maunds 15 seers and the Lucerne 13 maunds 15 seers per acre. It is expected to have a few more cuttings from each of them. Green oats gave an outturn of 81 maunds per acre

A small plot of potato was grown to test a few varieties. The following results were obtained :—

Variety.	Outturn in pounds per acre.
Darjeeling	8,240
Magnumbonum (Obtained from Shillong)	6,560
Windsor Castle (ditto)	4,920
King of Potato (ditto)	4,920

The following additional crops were also grown :—

(*a*) *Sugarcane.*—This crop grew well and was free from any serious disease. 73,550 cuttings have been supplied from the farm for demonstration work outside. The highest outturn of gur was obtained from ·53 acre of Striped Tanna cane grown on good land, and amounted to 70 maunds of gur per acre.

Outturn of Gur.

Varieties.	Total area.	Outturn.	Outturn per acre.
		mds. srs.	mds. srs.
Gandari	·75	47 12	63 4
Samsara	·02	9 10	46 10
147-B	·77	43 30	56 30
Vandamukhi	·75	35 16	47 8
Yellow Tanna	·58	38 8	66 0
Striped Tanna	·53	37 16	70 0
Khagrai	·08	2 13	29 0

Financial Statement.

Receipts.

	Rs.	A.	P.
Amount credited into treasury	7,423	8	6
Amount realized in March 1918 but not credited into the treasury before 1st April 1918	100	3	3
Stock in hand	3,142	3	6
Bills outstanding	2,730	13	3
Rents of the Superintendent of Agriculture's quarters (credited into the treasury) ...	421	1	9
Total ...	13,817	14	3
Deduct value of farm produce of previous year sold and realised during the present year	121	14	0
Total ...	13,696	0	3

Expenditure.

	Rs.	A.	P.
Special contingencies ...	5,676	0	3
Recurring expenditure ...	16,536	14	0
Value of cattle-food held over from previous year's stock	1,479	10	6
Total ...	23,692	8	9
Deduct value of cattle-food in stock on 1st April 1918	246	1	6
Total ...	23,446	7	3

Staff.—I was on leave up to the 18th July 1917, when Babu Jamini Kumar Biswas held charge of this farm. I visited the dairy farms at Pusa, Sepaya, Lucknow and Cawnpore. There were considerable changes in the subordinate staff of the farm during this year.

Visits.—The farm was visited once by the Hon'ble Mr. J. G. Cumming, Member in charge, once by the Collector, once by the Director of Agriculture and frequently by the Deputy Director of Agriculture, Eastern Circle.

J. N. CHAKRABATTI,
Superintendent of Agriculture, Dairy Farm, Rangpur.

R. DAS GUPTA,
Offg. Deputy Director of Agriculture, Eastern Circle.

ANNUAL REPORT OF THE RANGPUR DEMONSTRATION FARM FOR THE YEAR 1917-18.

I. *Introduction.*—This farm is situated in the heart of the civil station. It was started in 1914 by the Rangpur Agricultural Association. In 1911 it was made over to the Agricultural Department for making it a seed producing farm for the district.

II. *Area.*—The total area of the farm is 20 acres (*i.e.*, 60 bighas), of which 16 acres are under cultivation, the remainder being occupied by roads, drains, buildings, etc.

III. *Rainfall.*—The rainfall for the year under report is as follows :—

Year and month.	Actual on Farm.		Remarks.
	Rainfall.	Number of rainy days.	
1917.			
January ...	Nil	Nil	
February ...	·32	1	
March ...	·18	1	
April ...	Nil	Nil	
May ...	14·84	13	
June ...	17·98	26	
July ...	10·89	15	Rainfall was deficient in July and August, and as such transplantation of paddy was not possible on a considerable area.
August ...	3·81	11	
September ...	3·98	5	
October ...	31·35	7	Water-logged. Unusual rainfall in October did considerable damage to standing crops and delayed rabi sowings.
November ...	Nil	Nil	
December ...	Nil	Nil	
1918.			
January ...	Nil	Nil	
February ...	Nil	Nil	
March ...	Nil	Nil	
Total ...	83·35	79	

TABLE II.

Crops outturns for the year 1917-18.

Aus paddy (Oryza sativa).

Serial No.	Name of paddy.	Area in acre.	Outturn in acre in lbs.	Remarks.
1	Chaplas ...	·28	1,953	Want of sufficient rain water affected the outturn.
2	Puki ...	·41	1,211	
3	Jaseoa ...	1	1,500	
4	Betho ...	2·12	681	

Kakya Bombai jute grown in one block for testing the uniformity. The plots exhibited considerable irregularity in fertility.

Sugarcane.—Varieties grown with outturns obtained are noted below :—

Name of sugarcane.	Area in acre.	Yield per acre.	Remarks.
1. Barbadoes 147 ...	·83	3,238	Fairly hardy but suaps readily.
2. Ditto 3412 ...	·83	2,793	Seems possible to improve further when acclamatised.
3. Red Mauritius ...	·01	3,304	Ditto.
4. Dacca Gandari ...	·83	4,723	A thick, soft, fairly good cane. Dacca gandari and B. 147 are the best chewing canes.

Rabi crops—Potatoes (Solanum tubersum).—The following table shows the outturn of the different varieties of potatoes grown this year. The Darjeeling variety gave the best yield :—

TABLE V.

No.	Name of potatoes.	Area in acres.	Yield per acre.
1.	Windsor Castle	·03	18,096
2.	King of Potato	·03	21,247
3.	Darjeeling	·04	31,352
4.	Magnumbonum	·03	21,812

Oats and peas (Avena sativa and Pisum Arvense).—These were grown in 3 acres ; a portion of green fodder was sold at 6 annas per maund.

Khesari (Lathyrus sativus) and Lentil (Arvum lens).—Khesari were sold as a catch crop on 2·08 acres after winter rice.

New crop.—The Fibre Expert tried on half an acre 55 lbs. of seeds, and 545 lbs. of straw were obtained. The plants attained a good height, the average being 4 feet 6 inches.

Groundnuts.—Groundnut was planted on ·30 acre. The flood in October completely destroyed the crop.

Laying out of plots.—The farm is being laid out in standardised plots of 1-10th acre each.

Expenditure—

		Rs	A.	P.
1.	Purchase and feed of cattle	450	0	0
2.	Purchase of seeds, manure and implements ...	235	0	0
3.	Wages of farm labourers	1,805	0	0
4.	Petty repairs	730	0	0
5.	Railway freight	1	1	0
6.	Stamps	9	8	0
7.	Rent	28	7	0
8.	Miscellaneous	200	0	0
	Grand Total ...	3,459	0	0
	Amount credited into the local treasury	516	0	0
	Bill outstanding	795	4	3
	Value of stock in hand	307	4	0
	Total ...	1,618	8	3

Training of apprentices.—Six union munshis received short courses of training on handling of implements and general farm works during the year.

Visits.—The farm was visited by the Hon'ble Mr. J. G. Cumming, Member in charge, and by the officers of this Department several times during the year.

Staff.—During the year under report Babu Mohini Mohan Ghose was in charge of the farm, who was helped by Babu Jamini Nath Chakravarty up to the 31st December 1917, when the latter went on three months' leave. Babu Sankar Prasad Bhattacharya officiated in his place.

R. DAS GUPTA,

Offg. Deputy Director of Agriculture, Eastern Circle.

ANNUAL REPORT OF THE BURIRHAT FARM, RANGPUR, FOR 1917-18.

The Burirhat Farm is situated on the borders of the tobacco growing tract, 5 miles north of the Rangpur town.

The farm is 52 acres in area and divided into five blocks. The soil is a sandy loam with a sandy sub-soil and is deficient in lime. The soil, which was originally very poor, has now been much improved by systematic cultivation and manuring, and any part of the farm is now capable of growing a good crop of tobacco. The rainfall of the district is high. The following table gives the rainfall during the year:—

Month	Actual.		Normal.	
	Rainfall.	Number of days.	Rainfall.	Number of days.
1917.				
April	...	...	3·01	4·3
May	14·95	10	10·66	11·5
June	20·35	13	18.00	15·7
July	11·50	8	15·89	15·0
August	7·03	12	12·80	13·7
September	5·80	7	14·24	13·3
October	33·70	6	4·87	4·4
November	...	...	0·12	0·2
December	...	...	0·05	0·2
1918.				
January	0·07	2	0·50	0·9
February	...	...	0·54	1·2
March	0·24	2	1·25	1·8

The rainfall was on the whole unfavourable.

The season started favourably in August, but the abnormally heavy showers in October flooded the seed beds and hampered transplanting. The weather in February and March was also unfavourable to the curing of the leaves. The followfng table shows the areas under the respective crops : —

	Area in acres.
(*a*) *Bhadoi or rain crops.*—	
Cowpea (*Vigna katiang*) for green manuring	22·33
Jowar *Sorghum vulgare*) for fodder	1·00
Aus paddy (*Oryza sativa*)	15·67
	39·00
(*b*) *Rabi or cold weather crops.*	
Tobacco(*Nicotina Tabacum* and *Nicotina rustica*)	
Local	8·31
Sumatra	2·83
American or Turkish cigaretter tobacco	0·20
Oats (*Avena sativa*) and peas (Pisum *vrvense*)	20·33
Lentils (*Arvum lens*)	7·33
	39·00

Last year's scheme of experimental work was continued, viz.—

(1) The growing of Sumatra tobacco for cigar wrappers.
(2) Comparison of the different varieties of tobacco in the province.
(3) Selections from the local varieties of tobacco.
(4) Manurial experiments.

Sumatra Tobacco. During the year 2·83 acres of this has been grown as compared with 2·5 acres last year. The crop is quite satisfactory.

Cigarette tobacco.—A few varieties such as White Burley, Yellow Prior and Orinoco were grown this year with fair results. A small quantity of Turkish tobacco has also been grown for seed only. It is satisfactory to note in this connection that last year many tobacco merchants offered high price for the leaves (sometimes as high as Rs. 1-12 per lb.), and this year also even before the curing is complete, they are competing with each other keenly for the purchase of the leaves.

Local tobacco.—27 different varieties, collected from various districts, were tested. As yet none of these outside varieties have proved superior to the Rangpur tobacco.

Improvement of tobacco for the Burma market.—The local Chilakhal Bhengi variety has been found suitable for the Burma market and an attempt is being made to improve this.

Green manure for tobacoo.—The value of green-manuring with cowpea has been thoroughly established and is being demonstrated in the tobacco tract.

Manufacture of Cheroots.—A cigar roller has recently been appointed and good cigars are being made from the Farm tobacco. The object of this is to train up young boys of the district to learn rolling and establish this as a home industry.

Demonstration.—With a view to popularise the cultivation of Sumatra tobacco among the raiyats, arrangements have been made to grow and cure the variety round about he arm. This year 20 maunds of tobacco have been grown and three curing sheds erected. An experiment has also been started to see if a combined ashed can be erected to keep cows and cure tobacco as well. If successful, this will minimize the initial cost.

Implements.—The spring tooth harrow and Planet Junior hand hoe have been found very successful. The hoe invented by Babu I. K. Biswas, the late Farm Superintendent, is also in use and found satisfactory.

Inspection and visits.—The Hon'ble Mr. J. G. Cumming visited the farm once. The Director of Agriculture inspected it twice and the Deputy Director, of Agriculture several times.

Financial statement.—The following table shows the receipt and expenditure for the year :—

Receipts.	Rs.	A.	P.	Expenditure.	Rs.
Amount remitted to treasury	5,492	1	3	Regular contingencies ...	6,900
Value of seeds and implements supplied to other farms ...	95	6	3	Capital charges ...	1,200
Bills outstanding	151	4	0		
Stock in hand	318	0	0		
Total ...	6,058	11	6		8,100

R. DAS GUPTA,

Offg. Deputy Director of Agriculture, Eastern Circle.

REPORT OF THE CHINSURAH AGRICULTURAL STATION FOR THE YEAR 1917-18.

1. *Introduction.*—This farm of 210 acres has a soil typical of the Hooghly district, and is suited for winter paddy chiefly. A small area is high enough to grow jute. Experiments on improving the quality and quantity of these two main crops along with sugarcane, plantain and papya comprise

the chief work. A large quantity of pure seeds of Indrasail and Nagra for distribution throughout the Province are now being grown.

2. *Situation and brief history.*—The farm is situated to the west of the East Indian Railway line between Chinsurah and Hooghly stations. It is only 38 inches above sea level. The station was opened in 1908.

3. *Irrigation.*—The farm depends entirely on rainfall. Iron dons for short lifts, bullockgear, double chain pump and an oil engine pump for 10 to 12 feet lifts are used so long as there is water.

4. *Soil.*—The soil is mostly a clay loam and represents the Gangetic alluvium to the west of the Hooghly. It is fertile and capable of growing good crops. The following table shows the percentage figures of analyses of the soil and subsoil :—

	Highland soil No. 1A, Lab. No. 144.	Highland subsoil No. 1B, Lab. No. 145.	Block A soil No. 2A, Lab. No. 146.	Block A subsoil No. 2B, Lab. No. 147.	Medium soil No. 3A. Lab. No. 148.	Medium subsoil No. 3B, Lab. No. 149.	Lowland soil No. 4A, Lab. No. 150.	Lowland subsoil No. 4B, Lab. No. 151.
Insoluble silicate and silica	77·25	...	71·20	...	67·00	...	63·38	...
Combined water and orgaine matter.*	5·29	...	5·05	...	8·33	...	9·59	...
Ferric oxide and alumina ...	14·77	...	20·14	...	21·48	...	22·84	...
Lime	·96	...	1·53	...	1·00	...	1·57	...
Magnesia	·31	...	·26	...	·55	...	1·75	...
Potash	·85	1·63	1·29	1·22	1·31	1·17	1·51	1·01
Soda	·55	...	·39	...	·27	...	·27	...
Phospherie anhydride† ...	·02	·15	·12	·10	·06	·12	·09	·32
Total ...	100·00	...	99·98	...	100·00	...	100·00	...
*Containing nitrogen ...	·09	·073	·091	·088	·091	·064	·134	·122
†Containing phosphoric anhydride soluble in 1 per cent. citric acid solution	·014	...	·016	...	·005	...	·007	...

5. *Season and Rainfall.*—The year under report was favourable for winter paddy. The excess rainfall of 13·61 inches from May to July was unfavourable to the jute crop as the land became water-logged early in the season and drainage was impossible.

The table below shows in inches the average normal rainfall and the actuals recorded on the farm during the period :—

Month.	Average rainfall at sadar.	Actual rainfall recorded on the farm.		Comparison with normal.	
		Rainfall.	Number of rainy days.	Excess.	Deficit.
1917.					
April	2·46	·95	2	...	1·51
May	5·85	7·90	13	2·05	...
June	10·56	14·56	20	4·00	...
July	11·28	18·84	15	7·56	...
August	11·64	8·91	21	...	2·73
September	8·40	8·44	13	·04	...
October	4·09	10·32	7	6·23	...
November	0·66	Nil	Nil	...	0·66
December	0·19	Nil	Nil	...	0·19
1918.					
January	0·38	Nil	Nil	...	0·38
February	1·20	Nil	Nil	...	1·20
March	1·58	·50	3	...	1·08
Total ...	58 29	70·42			

The following table shows the average monthly temperatures (maximum and minimum) in Fahrenheit in the open and in shade on the farm for the year :—

Month.	Average Temperature.				
	Maximum.		Minimum.	Godown.	
	Solar.	Shade.	Solar.	Maximum.	Minimum.
1917.					
April	106	93	78	117	77
May	104	90	77	115	78
June	95	86	80	107	79
July	91	86	80	106	79
August	96	83	67	98	79
September ...	95	79	77	97	76
October	93	85	74	101	75
November ...	94	77	75	99	71
December ...	87	70	56	95	51
1918.					
January	81	72	54	90	51
February ...	85	76	57	93	56
March	92	85	69	90	60

6. *Scientific work done during the year—*

1.	Winter Paddy—Aman Dhan ...	...	Orzya Sativa.
2.	Jute —Pat ...	...	Corchorus.
3.	Sugarcane —Akh ...	...	Saccharum Officinarum.
4.	Banana —Kala ...	...	Musa Paradissica.
5.	Papya —Penpey ...	...	Carica Papya.
6.	Arrowroot —Arrarut ...	...	Canna Edulis.

(1) *Winter paddy.*—In addition to producing a large quantity of selected seed for distribution and district demonstration work and the carrying out of the manurial and varietal tests, Block A, 50 acres in extent, was tested plot by plot for uniformity. This entailed very much work. Results are given in Appendix A, and show how variable the soil is from plot to plot. This work will be repeated in 1918.

A. Seed selection and pure line cultures and trials under the guidance of the Economic Botanist were carried out on 10·2 acres. Elimination of undesirable samples and the development of heavy-fruiting pure line approved varieties made considerable progress, and about 2,000 maunds of selected seeds were supplied to the Province at the close of the year.

B. Eight approved varieties, including Dacca No. 1 (Indrasail) of the Economic Botanist, were grown. The outturns in general from each may be seen below :—

Paddy crops.	Actual figures of cultivation.			Average outturn per acre.	
	Area in acres.	Outturn.		Grain.	Straw.
		Grain.	Straw.		
		Mds. sr.	Mds. sr.	Mds. sr.	Mds. sr.
Nagra (Hooghly No. 1) ...	45·51	1,322 38	1,545 32	29 15	34 10
Dacca No. 1 (Indrasail) ...	51·79	1,247 35	1,650 20	24 4	32 6
Jhingashal	3·00	69 10	118 24	23 3	39 21
Hatishal	9·78	241 6	323 13	24 27	33 2
Kataribhog	2·00	50 2	50 36	25 1	25 18
Dadkhani	2·25	49 23	79 20	22 4	34 21
Badshabhog	2·00	49 28	70 7	24 34	35 4
Samudrabali	2·00	47 0	82 18	23 20	41 9

One maund=82 pounds.

Varietal experiments were made in two series, the first with the above eight varieties on acre blocks and the second with Nagra, Dacca No. 1, Hatishal and Jhingashal on one-fourth acre; each carried out four times in varying positions on the same block. The results are embodied in the following statement :—

Series I.

Varieties tried.	Outturn per acre.		Value.
	Grain.	Straw.	
	Mds. sr.	Mds. sr.	Rs. a.
Nagra (Hooghly No. 1) ...	28 30	32 38	72 11*
Dacca No. 1 (Indrasail) ...	28 13	49 39	73 15*
Hatishal	26 6	35 14	69 10†
Jhingashal	25 11	43 0	65 11
Kataribhog	25 2	25 36	71 6
Dadkhani	23 28	38 28	70 13
Badshabhog	27 9	42 14	79 1‡
Samudrabali	23 1	33 10	71 7

* Close competition. † Kept erect while others lodged. ‡ Paid best.

Series II.

Varieties tried.	Outturn per acre.		Value.
	Grain.	Straw.	
	Mds. sr.	Mds. sr.	Rs. a.
Nagra (Hooghly No. 1) ...	29 11	36 3	71 12
Dacca No. 1	25 35	46 9	67 11
Hatishal	21 0	35 37	60 10*
Jhingashal	20 23	31 32	55 5

* Kept correct while others lodged.

The table below shows the average outturn per acre of the eight varieties of which four are being tried for nine successive years :—

Varieties tried.	Average outturn per acre in maunds (82 lbs.).																	
	1909-10.		1910-11.		1911-12.		1912-13.		1913-14.		1914-15.		1915-16.		1916-17.		1917-18.	
	Favourable rainfall.		Transplanting very late.		Scanty late rains.		Favourable rainfall.		Favourable rainfall.		Transplanting late, late rains deficient.		Transplanting late season short.		Transplanting very late, late, rains excessive.		Very favourable, October rain abnormally in excess.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
														K. P.				
Dadkhani	19¾	24	9⅝	16¼	17⅛	25¾	18½	23⅛	26¼	30	7½	31⅛	10¾	1 8	18	31½	23¾	38¾
Badshabhog	20⅛	35	12½	17⅛	20⅜	37	16⅝	26⅜	28¼	47⅞	11	31⅛	9½	1 4	12⅝	21¼	27¼	42⅜
Hatishal	19	26⅛	10⅜	16⅜	12⅞	36	22	36⅜	23⅜	39¼	14⅛	33⅛	27⅛	1 12	5¼	7⅜	26⅛	35⅜
Nagra	29½	32⅛	9	16⅛	19⅛	29¾	21¼	24⅜	31¼	34⅛	11½	42⅛	23⅜	2 2	21⅜	20⅜	28¾	33
Dacca No. 1 (Indrasail)	...	...	...	...	...	...	...	..	...	...	13¼	37 1/16	22	1 14	22	20	28⅕	50
Kataribhog	...	...	...	...	...	...	...	...	...	...	8⅝	31	14⅛	1 11	17⅛	21½	25	25⅞
Samudrabali	...	...	..	...	...	...	...	...	...	...	11½	14⅜	16¼	1 15	10⅝	11⅛	23	33¼
Jhingashal	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17⅞	17¾	25¼	43

* Hatishal, Nagra, Badshabhog and Dacca No. 1 (Indrasail) are the most paying varieties.

C. *Manurial.*—The experiments were made on Nagra paddy in three different series and the results are given below, The excess rainfall of 13·61" (41·3,, against normal 27·69") from May to July was unfavourable to dhaincha owing to late sowing.

Series I.

Manures applied per acre.	Total cost of manuring per acre.	Outturn per acre.		Total value per acre.	Financial result over unmanured.
		Grain.	Straw.		
	Rs. A.	Mds. sr.	Mds. sr.	Rs. A.	Rs. A.
Nil	...	23 4	21 36	57 4	...
Castor cake 6, maunds	18 2	28 7	40 30	69 11	5 11
I. O. P. cake, 6 „	12 8	29 4	45 25	73 13	4 1
Cowdung, 100 „	5 15	26 30	42 5	68 4	5 1
Dhaincha green-manured (seed-rate 7½ seers per acre).	2 0	33 30	55 0	84 1	24 13.

The unmanured plot is very high this year.

The unmanured plot being contiguous received washings through heavy rains from the manured are a which seems to have washed out. Dhaincha is always a success though the plants only grew 1 foot in height.

Series II.

Manures applied per acre.	Total cost of manuring per acre.	Outturn per acre.			Financial result over unmanured.
		Grain.	Straw.	Total value.	
	Rs. A.	Mds. sr.	Mds. sr.	Rs. A.	Rs. A.
Unmanured ...	...	23 4	21 36	57 4	...
Dhaincha green-manured.	1 12	33 9	41 12	81 5	22 5

Series III.

	Rs. A.	Mds. sr.	Mds. sr.	Rs. A.	Rs. A.
Unmanured ...	...	23 4	21 36	57 4	...
I. O. P. cake, 6 maunds	12 6	35 3	38 14	82 14	13 4

I. O. P. cake cost Rs. 12 per acre.

The utility of dhaincha green-manuring is well established. The following table shows the results of six successive years :—

Manures per acre.	Average outturn per acre in maunds (82 lbs.).											
	1912-13.		1913-14.		1914-15.		1915-16.		1916-17.		1917-18.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
Nil	21¼	29⅜	24¼	32½	14⅛	25½	18½	23¼	11⅜	11½	23	22
Cowdung, 100 maunds	23⅛	37½	*32⅜	43⅝	16¾	28½	24½	26¾	14⅜	15¼	26¾	42⅛
Dhaincha green-manured	*29½	46¼	29⅜	34¼	*18¼	33¾	*29¼	36½	*16⅝	17½	*33½	48¼

*Dhaincha best cowdung in 5 cases out of 6, and unmanured by an average of 6 maunds per acre even under worst conditions.

D. A comparison in relative merits of particular varieties regarding succession after jute in the same year was made, and it has been observed, as will be seen below, that Hatishal pays better than Nagra for a rotation after jute :—

Particulars.	Outturn per acre.					
	Grain.		Straw.		Total value.	
	Mds.	sr.	Mds.	sr.	Rs.	A.
Nagra paddy after jute	22	7	26	31	56	4
Hatishal ditto*	21	9	28	19	62	0

* Hatishal sells 4 annas per maund higher than Nagra.

(2) *Jute.*—The deficient rainfall in March and April delayed the preparation of land, while the heavy rainfall during May to July was unfavourable for this crop in 1917.

A. Seed selection and pure line cultures and trials, under the guidance of the Fibre Expert, were made on 14·78 acres ; 6 acres failed altogether and and were ploughed in.

B. Varietal comparisons, each with duplicates and standards, were made in two series, and the results are embodied below. Further trials will be necessary before any conclusions can be drawn. We hope to get an improved Olitorius variety suitable for Western Bengal. The results obtained by Fibre Expert at Rajshahi on this race are very satisfactory. Trials are being made out in the districts this year :—

Serials I.

Pureline Olitorius varieties tried.	Average outturn per acre.		Percentage of fibre to weight of green plants.
	Green plants.	Fibre.	
	Md.	sr.	Md.	sr.	
Rajshahi No. 14	264	39	13	14	5·08
Do. „ 15	328	33	16	4	4·88
Do. „ 26	307	21	14	30	4·57
Do. „ 27	339	33	18	25	5·39
Do. „ 30	353	37	17	3	4·81

Serials II.

Jute varieties tried.	Outturn per acre.		Percentage of fibre to weight of green plants.
	Green plants.	Fibre.	
	Md. sr.	Md. sr.	
Hooghly red 90	227 20	18 35	8·30
Kakya Bombai No. 7 ...	145 0	7 21	5·17
Rajshahi Tosha No. 15 ...	179 6	6 37	3·62
Ditto No. 14 (Dudsahi).	208 16	10 18	5·00
Ditto No. 18 (Lalbodam).	142 28	7 25	5·32
Dacca Green	176 10	8 2	5·40
Rajshahi No. 29	281 15	13 17	4·95
Hooghly red	237 26	11 33	4·97
Rajshahi No 27	112 8	3 22	4·12

(3) *Sugarcane.*—Owing to the heavy rainy season and impossibility of drainage during May—July the second application of manure and proper earthing and drainage was not possible. Further, the necessary cultivation could not be given. Still, the results as seen below are very good.

A. *Seed selection.*—A great improvement in the cultivation of the cord in the Burdwan Division, through the efforts of the farm, is already manifest. Due care was taken of the seed propagation area with pure and selected types and about 117,000 sound and healthy sets were raised and distributed at the close of the year. The demand for cuttings is steadily and rapidly increasing.

B. *Varietal.*—The varietal trials, each with duplicates, were made in two series, manured with cowdung 200 maunds, castorcake 4 maunds, cane ash 3 maunds, superphosphate 2 maunds and sodium nitrate 30 seers per acre and planted in double rows, 2 feet apart, on the ridge-and-furrow system, 2 feet 6 inches each. The results are embodied below :—

Series I.

Varieties tried.	Average outturn per acre.		Percentage figures.			Remarks.
	Canes.	Gur.	Juice from canes.	Gur from juice.	Gur from canes.	
	Mds. Srs.	Mds. sr.				
Striped Tanna (Mauritius).	1 008 20	163 13	73·8	21·9	16·1	Very hardy, good gur.
Yellow Tanna (Mauritius).	1,134 10	140 35	72·5	17·1	12·4	Ditto ditto.
Red Mauritius ...	909 0	118 32	71·8	18·1	13·0	Not very hardy, gur medium.
Berbadoes 3412 ...	858 13	105 35	70·9	17·3	12·3	Fairly hardy, gur medium.
Shamsara ...	693 30	102 38	71·5	20·7	14·8	Soft, fairly hardy, good gur.
Berbadoes 147 ...	710 35	95 22	71·9	18·6	13·3	Snaps readily, gur dark.
Khari ...	751 10	92 5	65·4	18·7	12·2	Very hardy, gur medium.
Vendamukhi (Rajshahi)	702 35	89 29	70·6	17·9	12·6	Not very hardy, good gur.
Dacca Gandari ...	580 15	89 21	71·3	21·6	15·4	Very delicate good gur.
Berbadoes 208 ...	366 10	55 25	68·4	22·2	15·2	Very soft and delicate, excellent gur with biggest crystals.

Series II.

(On a little higher situation hardly cultivated before.)

Varieties tried.	Average outturn per acre.		Percentage figures.			Remarks.
	Canes.	Gur.	Juice from canes.	Gur from juice.	Gur from canes.	
	Mds. srs.	Mds. sr.				
Red Mauritius ...	717 35	106 6	68.7	21·5	14·7	Figures based on a single plot.
Striped Tanna (Mauritius).	722 35	104 25	68·1	20·3	14·1	Immune from pests.
Berbadoes 3412	737 30	102 7	68·4	20·1	13·8	
Do. 147	622 20	92 7	69·0	21·4	14·8	
Yellow Tanna (Mauritois).	616 10	89 35	66·8	21·2	14·2	Immune from pests.
Berbadoes 208	484 32	77 19	68·5	23·3	15·9	Susceptible to adverse conditions, diseases and pests.
Dacca Gandari ...	422 35	66 33	69·2	22·8	15·8	Ditto ditto.

Mauritius Tanna, Red Mauritius and Berbadoes 3412 are definitely recommended for gur corp. For chewing canes Shamsara, Dacca Ganderi and Berbadoes 208 are the best.

(4). *Banana.*—The Dacca-Rampal varieties made good progress during the period under report. Some excellent fruits were obtained, the Amritasagar and Dudsagar varieties of Dacca being highly appreciated and preferred to Martaman, the best of the local types. Amritasagar seems to be delicate and not able to stand dry heat well. Limited suckers are properly trained for propagation purposes, and there is already a good demand for shoots, about 400 being supplied during the year. Definite varietal results will be obtained from the fresh plantation to be started next year.

(5). *Papaya.*—Ceylon and Bangalore types, planted on the sides of a tank last year, came to bearing during the period under report. Some fruits, 15″ long with a girth of 2′ 3″ across the middle, were obtained. Seeds are collected from selected plants and fruits and properly dried. There is already a demand for this seed.

(6) *Arrowroot.*—Some rootbulbs were obtained of the Queensland type of Canna Edulis and grown. The starch manufactured was judged to be of superior quality at the Calcutta Food Products Exhibition, 1918.

VII.—*Supply of seeds.*—The demand for seeds is increasing. The following demands were met :—

Paddy—
Seedlings 2½

Kahans (sufficient to transplant 5 acres).

Seed—

	Mds.
Nagra	89½
Dacca No. 1 (Indra sail) ...	1,256½
Jhingasal	5¼
Hatishal	10¼
Kataribhog	5¼
Badsabhog	10½
Samudrabali	3¼
Dadkhani	10¼
Jute seeds 8 varieties ...	3¼
Dhaincha seed	8½
Arhar	1½

Sugarcane—

	Sets.
Yellow Tanna	18,434
Striped do.	5,106
Red Mauritius	3,706
Berbadoes 147	28,791
Ditto 208	3,630
Ditto 3412	7,026
Shamsara	10,530
Dacca Ganderi	6,336
Vendamukhi	2,840
Khari and other varieties ...	200
Total ...	86,599 (besides farm requirements).

	Nos.
Plantain shoots—	
Kanthali	32
Chini Kanthali	30
Champa	32
Chini Champa	30
Martaman	42
Kanchkela	22
Agniswar	47
Dudsagar	47
Savari	53
Amritasagar	53
Arrowroot bulbs ...	5 seers.
Papaya seeds	20 totals.

(8) *Visitors' Conference and Exhibitions.*—The number of visitors considerably increased during the year. All enquiries on agricultural matters were answered.

A meeting presided over by the Divisional Commissioner was held on the farm in August 1917. Interested cultivators and members of the Burdwan and Presidency Divisions were present.

The various crops and the work on the farm were shown and explained to the assembly. The utility of dhaincha green-manure for aman paddy and the benefit of selected seeds were demonstrated.

A complete set of farm exhibits was sent to the Sripur-Balagar (Hooghly) Mela, the Calcutta Food Products Exhibition, the Hooghly Exhibition, and the Suri Mela and the Banjetia Exhibition (Berhampur), where demonstrations were given. The work of the farm was much appreciated.

(9) *Practical training of young men.*—Four young men, with fair education, of the cultivator class received practical training during the year on an allowance of Rs. 15 each per mensem with free quarters.

(10) *Management and inspection.*—Babu Chuni Lal Mustafi was in charge of the farm during the year. He worked well.

(11) *Receipts and expenditure.*—The farm produce could not be sold before the close of the year. A valuation has been made:—

	Rs.	A.	P.
Receipts—			
Remittance to treasury	1,906	0	6
Bills receivable	175	11	0
Supplies adjusted by book transfer ...	380	5	0
Valuation of stock in hand on 31st March 1918 for disposal	10,034	15	0
Total ...	12,496	15	0
Expenditure—			
Wages of labourers and all other contingencies (exclusive of an extraordinary cost of Rs. 625-7-10 under heads specified below)	13,117	3	7
Purchase of cattle	1,170	12	0
Straw (farm crop of 1916-17 being very poor)	437	0	6
Beams, placards, field-labels, etc., and conference charges	1,200	0	0
Reclamation	798	11	0
Exhibition arrangements	150	0	0
Typewriter	359	8	0
Paulins	977	12	6
Gunny bags	314	0	0
Gurpan	71	8	0
Iron cartwheels	300	12	0
Extra stock of manures	350	0	0
Pucca floor and shed for oil engine ...	107	10	0
Total ...	13,117	3	7

(12) *Acknowledgment.*—The thanks of the Department are due to Mr. D. H. Lees, I.C.S., Commissioner of the Burdwan Division, Mr. S. C. Mukherji, I.C.S., Collector of Hooghly and to Mr. C. M. Pearce, General Traffic Manager, East Indian Railway, for their kind help and co-operation.

F. SMITH,

Deputy Director of Agriculture,
Western Circle, Bengal.

APPENDIX A.

Results of plot testing, Block A, Chinsurah Farm, 1917-18.

(Regular plots $\frac{1}{5}$ acre each.)

The figures in Roman denote the actual outturn of Nagra paddy in maunds and seers (1 md. = 82 lbs.) from that plot and those in Italic show the actual outturn of jute fibre (the jute crop failed).

N

i	*n*	*h*	*g*	*e*	*d*	*c*	*b*	*a*	
	5 28		Threshing floor.	6 37	5 32	6 20	6 11	5 1	27
	4 13	...		6 10	6 4	6 27	6 19	6 2	26
	...	...	4 35	5 33	5 38	6 22	6 27	6 2	25
	...	...	6 27	5 39	5 7	5 19	6 27	6 24	24
	...	5 20	...	6 6	...	6 32	...	6 8	23
	5 19	4 1	6 9	5 30	5 12	5 28	5 38	5 37	22
	5 39	5 18	6 4	6 7	6 35	5 22	5 11	6 0	21
	5 12	5 14 *0 27*	5 22 *0 23*	5 30 *1 19*	5 38	6 6	6 12	7 5	20
	5 27	5 21 *0 25*	5 21 *0 24*	5 13 *1 5*	4 7	6 39	6 6	7 23	19
	5 1	5 20 *0 31*	5 19 *0 19*	5 20 *1 1*	6 7	6 23	6 38	...	18
	...	5 11 *0 11*	5 20 *0 10*	5 9 *1 5*	6 12	...	7 5	... *0 34*	17
		6 1 *0 25*	... *0 26*	... *1 23*	6 20	6 27	6 16	... *1 33*	16
		5 27 *0 24*	... *1 10*	... *1 27*	6 6	6 39	6 26	... *1 37*	15
		5 35 *0 30*	... *0 18*	... *1 8*	6 1	6 11	6 37	... *1 18*	14
		4 37 *0 14*	... *0 19*	... *0 35*	4 17	6 38	5 32	... *0 35*	13
		5 20 *0 21*	4 18 *0 12*	4 11 *1 11*	6 12	6 31	7 17	6 16	12
		5 2 *0 24*	4 37 *0 4*	4 33 *1 8*	6 28	6 39	7 4	6 12	11
		6 11	4 32	6 20	6 26	6 35	7 13	6 29	10
		5 18	6 11	6 29	6 9	5 39	6 21	6 12	9
		...	6 29	...	5 17	...	5 38	5 36	8
		5 23	5 37	6 0	6 12	6 4	5 39	5 17	7
		5 31	5 34	6 6	6 14	5 37	5 36	5 8	6
		...	6 9	5 38	6 11	6 15	6 2	5 38	5
		Office	...	5 24	6 12	5 25	5 37	5 35	4
			...	4 22	...	5 8	4 0	5 2	3
			...	...	5 13	5 36	4 28	5 11	2
		Steading				...	6 7	5 16	1
									0

ANNUAL REPORT OF THE BURDWAN AGRICULTURAL STATION FOR 1917-18.

This agricultural station was opened in the year 1885.

The total area of the farm is 32 acres. The site was originally a piece of waste land overgrown with jungles. The soil is a poor sandy loam. The following table gives the chemical analysis of average samples of soil and subsoil of the whole farm :—

	Soil 1st, 9."	Sub-soil 2nd, 9."
Insoluble silicate and sand	88·52	87·47
Ferric oxide	3·60	3·68
Alumina	4·42	5·27
Lime	·34	·33
Magnesia	·34	·31
* Potash	·31	·32
Soda	·09	·07
† Phosphoric acid	·02	·03
Sulphuric acid	·01	·01
Carbonic acid	·04	·06
‡ Organic matter and combined water	2·31	2·45
Total ...	100·00	100·00
* Available potash	·04	·02
† Available phosphoric acid	·002	·001
‡ Nitrogen	·011	·007

The figures denote that the land is exceedingly poor in nitrogen and phospheric acid and poor in lime, but possibly contains enough potash.

This farm is irrigated from the Eden Canal running alongside it. Part of the area can occasionally be irrigated by flow during the rainy season, provided the main Damodar river is fed by flood. For rest of the season the lands are irrigated by three or more lifts.

The following table gives the normal rainfall at the Burdwan civil station and the actual rainfall recorded on the farm :—

Name of month.	Actual rainfall in inches, 1917-18.	Actual number of rainy days, 1917-18.	Normal.	
			Rainfall of 40 years.	Rainy days of 40 years.
1917.				
April	·40	1	2·20	3
May	6·16	9	5·56	6
June	14·86	17	10·17	12
July	12·86	20	12·32	15½
August	3·46	12	11·49	15
September	7·47	14	8·59	11
October	15·88	13	3·93	4
November	Nil	Nil	0·64	¾
December	Nil	Nil	0·13	¼
1918.				
January	Nil	Nil	0·38	¾
February	Nil	Nil	0·89	1½
March	1·89	4	1·24	1¾
Total ...	62·98	90	57·54	71½

The season was favourable for paddy, though the heavy rainfall in the end of November was too much for early ripening paddy, and put under water the whole area of sugarcane, which suffered from excessive wetness.

Operation of the year under report :—

(1) Scientific work.
(2) Distribution of seeds and manures.
(3) Practical training of apprentice.
(4) District (demonstration) work.

(1) (*a*) Scientific work on the following crop was taken up during the period under report :—

A. Paddy. C. Potatoes. E. Groundnut.
B. Jute. D. Sugarcane. F. Berseem.

A.—Paddy.

(1) *Manures on Paddy.* This is the chief work carried out at this farm. The following table details the different manures used, quantity applied, cost of same, areas, and yields obtained. The value of the crop is—grain Rs. 1-8 per maund and straw 4 annas per maund :—

Serial No.	Manures per acre.	Area in acres.	Cost of manures per acre.	Outturn in acre in lbs.	Value of outturn.
			Rs. A. P.		Rs. A. P.
1	Bonemeal, 3 mds. and green-manure with Dhaincha.	·32	9 15 9	Gr. 2,716 St. 4,735	68 2 3
2	Green-manure with Dhaincha ...	2·04	2 1 9	Gr. 2,470 St. 4,530	57 8 6
3	Bonemeal, 3 mds.	1·58	7 14 0	Gr. 2,419 St. 4,756	62 7 0
4	Cowdung, 100 mds.	1·90	8 4 0	Gr. 2,234 St. 4,346	62 7 3
5	Bonemeal, 3 mds. and nitrate of soda 1 md.	·29	19 14 0	Gr. 2,306 St. 5,494	62 12 3
6	Castorcake, 6 mds.	2·09	16 8 0	Gr. 2,140 St. 3,903	54 4 6
7	No manure	1·03	Nil.	Gr. 1,346 St. 2,091	33 1 0

Dhaincha green-manure, bonemeal, castorcake and cowdung are economical applications for aman paddy.

The following are figures for a test made with I. O. P. oilcake sent by Messrs. Graham & Co., Calcutta :—

	Manures per acre.	Area in acres.	Actual outturn in lbs.	Outturn per per acre.	Per acre value.
					Rs. A. P.
(*a*)	I. O. P. Oilcake 6 mds. per acre Cost of manure = Rs. 12.	·41	Gr. 767 St. 1,434	Gr. 2,287 St. 3,587	47 8 0
(*b*)	No manure	...	...	Gr. 1,336 St. 2,509	34 8 0
					13 0 0
			Deducting the cost of manures.		12 0 0
			Net profit ...		1 0 0

(2) *Variety.*—The following table gives the result of a test made with some local varieties of paddy and Indrasail :—

Varieties.	Areas in acre.	Actual outturn in lbs.	Outturn per acre in lbs.	Remarks.
(*a*) Dadkalma	·33	Gr. 869 St. 1,293	Gr. 2,607 St. 3,884	Local late variety.
(*b*) Jatakalma Karticsal ...	·33	Gr. 799 St. 1,244	Gr. 2,398 St. 3,731	Local early variety.
(*c*) Indrasail	·33	Gr. 846 St. 1,274	Gr. 2,567 St. 3,792	

During the period under report we had 8 inches more rainfall that normal years, and moreover the rain in October (viz. 15·88 *vrs.* 3·93 normal) benefited the late flowering varieties like Dudkalma and Indrasail inasmuch as it affected the early flowering variety of Jatakama-Karticsal. Further trial will be given to these varieties.

(3) *Method.—Rotatio of crop—Paddy in rotation with Jute the same year.*—During the period under report an outturn of 1,568 lbs. of Grain and 1,763 lbs. of straw was obtained per acre after a crop of 1,230 lbs. of jute fibre

B.—Jute.

A manurial test was made on jute during the period under report. The following results were obtained :—

Manure per acre.	Area in acre.	Actual outturn.	Outturn per acre in lbs.	Value per acre.
				Rs. A. P.
(*a*) Plot No. (1) Jute—Castorcake, 3 mds. ... Nitrate of soda, 150 lbs. (Cost of manure = Rs. 31-5)	·67	881	1,363	
(2) No manure	·33	333	999	
			364	35 8 0
		Deducting cost of manures.	...	31 5 0
		Net profit ...	...	4 3 0
(*b*) (1) Castorcake, 6 mds. ... Cowdung, 100 mds. (Cost of manure = Rs. 22-12)	·50	784	1,568	
(2) No manure	·25	239	1,172	
			396	30 9 6
		Deducting cost of manures.		22 12 0
		Net profit ...		7 13 6
(*c*) (1) I. O. P. oilcake, 9 maunds ... (Cost of manures = Rs. 18.)	·34	502	1,506	
(2) No manure	·34	395	1,186	
			320	31 3 3
		Deducting cost of manures ...		18 0 0
		Net profit ...		13 3 3
(*d*) (1) Cowdung, 150 maunds ... ... (Cost of manure = Rs. 9-6.)	·33	471	1,314	
(2) No manure	·10	121	1,209	
			105	17 0 0
		Deducting cost of manure ...		9 6 0
				7 10 0

C.—Potatoes.

(1) *Manures.*—This demonstration was made to show how we can economise the system of manuring.

The following table gives the result of the manurial demonstration made on potatoes of Darjeeling varieties :—

Manures per acre.	Area in acres.	Cost of manures.	Actual outturn in lbs.	Outturn per acre in lbs.
		Rs. A.		
(*a*) Cowdung, 200 maunds, castorcake 20 maunds	·11	70 0	1,090	9,913
(*b*) Cowdung, 200 maunds, castorcake, 10 maunds, super, 200 lbs., nitrate of soda, 200 lbs.	·11	77 8	1,353	12,300
(*c*) Local system—cowdung, 200 maunds, castorcake, 30 maunds.	·11	82 8	1,139	10,332

General manures amongst cultivators are 20 to 30 maunds of castorcake per acre. The above table will show that half the castorcake can well be replaced with nitrate of sada mixture.

(2) *Varieties.*—The following demonstrations were made to show the superiority of imported seeds of Darjeeling :—

Name of varieties.	Area in acre.	Actual outturn in lbs.	Outturn per acre in lbs.	Remarks.
(*a*) Patna	·24	2,529	10,565	Manures applied for acre— Cowdung ... 200 maunds.
(*b*) Nainital	·16	1,564	9,782	Castorcake ... 10 ,,
(*c*) Darjeeling	·28	3,782	13,509	Super ... 200 lbs. Na No_3 ... 200 ,,

D.—Sugarcane.

(1) *Manures.*—The following are the test made with nitrate of soda on sugarcane :—

	Manures per acre.	Outturn per acre in lbs.	Value.
			Rs. A. P.
(*a*) Plot No. (New crop)	(1) Cowdung, 250 maunds Castorcake, 8 ,, Na No_3 150 lbs. (Cost of manure 150 lbs. of Na No_3 = Rs. 23-7).	... 7 404	
	(2) Castorcake, 8 maunds Cowdung, 250 ,,	... 7,101	
		303	= 31 7 3
	Deducting the cost of Na Noz	...	23 7 0
	Net profit	...	8 0 3
(*b*) Ratooned crop— Rs. A. P. 56 4 0 cost of 45 0 0 ,, 11 4 0	(1) Castorcake, 10 maunds Nitrate of soda, 200 lbs. (2) Castorcake ...	... 4,108 ... 3,829	
		279	= 28 15 3
	Deducting the cost	...	11 4 0
	Net profit	...	17 11 3

(2) *Variety.*—A varietal demonstration was made with local canes, Puri, Samsara, etc., and White Tanna of Mauritius. The results of past few years have proved that Mauritius cane is suitable for this farm where the

crop often is affected by drought and flood as well. The heavy rainfall in October did not affect White Tanna of Mauritius to the same extent as local varieties, which being water-logged was partially ruined.

	Outturn per acre in lbs. Gur.
Mauritius cane	4,489
Local cane	360

E.—Groundnut.

This crop was grown on an acre of land formerly considered as barren. The crop was severely attacked by white ants. An outturn of 5½ maunds or 451 lbs. was obtained.

F.—Berseem.

The soil and the situation of this farm do not allow any rabi crop to grow successfully unless costly irrigation helps it. Seeds were sown broadcast on thin mud in the paddy plots in November, but the crop failed completely, the paddy became laid. Again seeds were sown on ordinary land after good cultivation. But owing to want of moisture this crop failed.

(*b*) *Conservation of cowdung.*—Cowdung is kept in a watertight pit covered with a thatched roof.

2. *Distribution of seeds and manures.*—The following seeds wore supplied to the cultivators during the period under report :—

(*a*) Paddy—Jatakalma Karticsal ... ... 1,127 lbs.
(*b*) Dhaincha seeds ... ... 31 „
(*c*) Jute seeds ... ... 33 „
(*d*) Sugarcane cuttings—Variety White Tanna ... ... 27,500 cut sets.
(*e*) Castormeal ... ... 12,300 lbs.

3. *Practical training of students.*—During the period under report only two apprentices received practical training.

4. *District demonstration work.*—The following results have been obtained at the area under demonstration outside the farm :—

Serial No.	NAME.	Address.	Crop.	Area in acres.	Manures.	Outturn per acre in lbs.	Cost of manures.
							Rs. A.
1	Mr. N. C. Sarkar ...	Benally, Raniganj, Burdwan.	Paddy ...	53½	Bonemeal, 3 maunds ...	2,460	7 11
				6⅔	Bonemeal, 3 maunds green-manured with Dhaincha.	2,829	9 9
				6⅔	Dhaincha greenmanure ...	2,337	1 14
				6⅔	Cowdung, 12 cartloads ...	2,460	9 0
				6⅔	Castorcake, 3 maunds ...	2,337	5 7
				...	No manure	1,927	...
2	Mr. N. C. Sarkar ... Babu Bamacharan Sirkar Villagers of	Baliarpur ... ... Ditto. Sankarpur, Raina thana, Burdwan district.	Do. ...	105	With bonemeal the result could not be obtained definitely as the area was affected by the Damodar flood four times during the period under report.		
3	Babu G. C. Dutta ...	Bantir, Raina thana, Burdwan district.	Do. ...	3½	Bonemeal, 3 maunds ...	1,476	7 14
				6⅔	Greenmanure with Dhaincha.	1,476	1 14
				54	Cowdung, 10 carts ...	1,968	8 4
				1½	Castorcake, 3 maunds ...	1,722	8 4
				1½	No manure	1,230	...
					This area was affected with the Damodar flood.		
4	Babu Abani Paul ...	Hatsimul Burdwan	Do. ...	1⅔	Bonemeal, 3 maunds ...	2,767	7 14
				⅔	Bonemeal, 3 maunds green-manured with Dhaincha.	2,798	10 0
				1⅔	Dhaincha greenmanuring	2,521	1 14
				2	Cowdung, 40 carts	2,829	8 4
				1⅔	Castorcake, 3 maunds ...	2,591	8 4
					No manure	1,814	...
5	Babu Sajani Kanta Haldar	Kanainatsal, Burdwan.	Do. ...	1⅓	Greenmanure with Dhaincha.	2,497	2 0
				⅓	No manure	2,244	...

Management.—The expenses of the farm are borne by the Hon'ble Maharajadhiraj Bahadur of Burdwan to whom the thanks of the public are due. The entire management is in the hands of the Bengal Agricultural Department. Babu J. C. De was Superintendent in charge during the year. He worked well.

The Deputy Director of Agriculture, Western Circle, Bengal, inspected the farm frequently. Some members of the Agricultural Associations, Burdwan and Birbhum visited the farm during the period under report.

F. SMITH,
Deputy Director of Agriculture.

APPENDIX A.

Farm Account—Agricultural Station, Burdwan, 1917-18.

	Rs.	A.	P.		Rs.	A.	P.
Receipt as opening balance ...	306	0	9	Expenditure as farm expenses ...	4,417	12	8
Raj contribution ...	2,500	0	0	Balance on 31st March 1918 ...	255	3	10
Deposited on sale-proceeds ...	1,866	15	9		4,673	0	6
	4,673	0	6				

Receipts—				*Expenditure*—	Rs.	A.	P.			
Deposited as sale-proceeds ...	1,866	15	9	Establishment ...			...	761	7	8
Bills receivable ...	233	12	6	Construction and repairs			...	53	4	0
Stock in hand ...	57	0	0	Implements ...			...	29	14	6
				Extra labour ...	2,721	15	6			
				Cattle food ...	75	11	0			
				Contingencies ...	197	13	9			
				Seeds ...	189	1	0			
				Manures ...	317	10	0			
				Rent and taxes ...	51	12	9			
				Office expenses ...	9	8	0			
				Postage ...	9	10	6			
					3,573	2	6	3,573	2	6
	2,157	12	3					4,417	12	8
	2,545	10	11	Bills receivable ...			...	285	10	6
Total ...	4,703	7	2	Total			...	4,703	7	2

APPENDIX B.

Statement of crops (area and outturn) 1917-18.

No.	Crops.	Nature of treatment or particulars.	Area in acre.	Total area in acre.	Actual grain.	Outturn straw.	Outturn grain.	Straw per acre.	Remarks.
A	Paddy—				Md. sr. ch.	Md. sr. ch.	Md. sr. ch.	Md. sr. ch.	
I	(1) ...	No manure— Manurial testing fertility	1·90	...	33 6 0	60 10 0	17 18 0	30 20 0	
	(2) ...	Bonemeal, 3 maunds per acre.	1·58	...	46 24 0	84 20 0	29 20 0	58 0 0	
	...	Ditto ditto ...							
	(3) ...	Nitrate of soda, 1 maund per acre.	·29	...	8 30 0	18 20 0	30 5 0	55 10 0	
	...	Bonemeal, 3 maunds per acre.							
	(4) ...	Greenmanure with Dhaincha.	·32	...	10 24 0	19 10 0	33 5 0	57 30 0	
	(5) ...	Ditto ditto ...	2·04	...	55 24 0	108 0 0	27 10 0	53 0 0	
	(6) ...	Cowdung, 100 maunds per acre.	1·90	...	53 17 0	128 0 0	28 5 0	67 0 0	
	(7) ...	Nitrate of soda, 100 lbs. per acre.	·63	...	9 24 0	16 0 0	15 10 0	24 0 0	Application followed by heavy rain.
	(8) ...	Castorcake, 6 maunds per acre.	2·09	...	54 21 0	99 20 0	26 4 0	47 24 0	
	(9) ...	I. O. P. oilcake, 6 maunds per acre.	·41	...	9 19 0	17 20 0	23 5 0	43 30 0	
	(10) ...	Unmanured	3·27	...	55 39 0	96 0 0	17 5 0	31 30 0	
II	(1) ...	Varietal Jatakalma Kartiesal.	·33	...	9 30 0	15 7 0	29 10 0	45 20 0	
		Dudkatma	·33	...	10 24 0	15 32 0	31 32 0	47 15 0	
		Indrasail	·33	...	10 13 0	15 17 0	30 38 0	46 10 0	
III		Rotation paddy after jute	1·96	...	37 19 0	41 20 0	19 5 0	21 20 0	
IV		Ordinary cultivation seed beds, etc.	1·03	...	16 24 0	26 18 0	16 17 0	25 20 0	
			...	18·41	422 18 0	761 34 0	22 37 0	41 15 0	Average outturn per acre.

No.	Crops.	Name of treatment or particulars.	Area in acre.	Total area in acre.	Actual grain.	Outturn straw.	Outturn grain.	Straw per acre.	REMARKS.
					Md. sr. ch.	Md. sr. ch.	Md. sr. ch.	Md. sr. ch.	
B—	Jute—(1)	Three maunds castor cake per acre.							
	(*a*) ...	15. lbs. Nitrate of soda per acre.	·67	...	...	10 30 0	...	16 25 0	
	(*b*) ...	No manure	·33	...	...	4 2 8	...	12 7 8	
	(2) (*a*) ...	Castorcake, 6 maunds. Cowdung, 100 maunds. per acre.	·50	...	...	9 22 8	...	19 5 0	
	(*b*) ...	No manure	·25	...	...	3 23 0	...	14 12 0	
	(3) (*a*) ...	I. O. P. oilcake, 9 maunds per acre	·34	...	...	6 5 0	...	18 15 0	
	(*b*) ...	No manure	·34	...	...	4 33 0	...	14 19 0	
	(4) (*a*) ...	Cowdung, 150 maunds per acre.	·33	...	..	5 30 0	...	17 10 0	
	(*b*) ...	No manure	·10	...	...	1 19 0	...	14 30 0	
	(5) ...	Damaged plot	·58	...	...	4 24 0	...	14 30 0	
			...	3·44	..	50 29 0	...	...	Average outturn pe acre completely damaged by pest.
C—	Potatoes	.....	2	2	260 27 0	...	130 13 8	...	
D—	Sugarcane	New canes	16·1	...	75 35 8	...	...	...	Average outturn per acre.
		Ratooned canes	10·6	...	21 9 12	...	...	...	
			...	...	97 5 4	...	36 15 0	...	Cane suffered from water-logging.
E—	Groundnut	.....	1	...	5 24 0	...	5 24 0	...	
F—	Lentil ...	.....	1	...	1 2 0	...	1 2 0	...	Suffered from want of moisture.

The following report is submitted by Mr. Edmunds, Farm Manager who worked well during the year.

F. SMITH,

Deputy Director of Agriculture.

ANNUAL REPORT OF THE DEMONSTRATION FARM, ST. ANDREW'S COLONIAL HOMES, KALIMPONG, FOR THE YEAR 1917-18.

Situation and History.—The village of Kalimpong is the headquarters of the sub division of Daling (a Government estate of 401 square miles). The district was ceded to the British Government after the Bhutanese war of 1864-65. The settlement of the estate restricts the ownership of land to hill tribes, and at the same time makes provisions by which Lepchas and Bhutias are only allowed to dispose of their land amongst themselves. This condition was introduced to prevent the more thrifty and enterprising Nepalese from becoming possessors of all the land in the district, which would to a great extent have been the case had no steps been taken to prevent it.

All transfers go through the Khas Mahal office, and an annual ground rent of 6 annas to Re. 1-4 per acre is charged by Government.

Kalimpong has a fairly large bazar, and is the mart for produce of a considerably large area, in addition to which it is the centre of Tibetan trade with Bengal.

It is only eleven miles by road from the nearest railway station, Kalimpong Road, a station on the Siliguri-Teesta Valley Extension, Darjeeling-Himalayan Railway.

The demonstration farm is situated below the bazar on the easterly slope which runs down to the Rilli river, a tributary of the Teesta, joining the latter at Riang.

Although about 24 acres of land had been cultivated by the Homes prior to April 1907, the remaining portion was not taken over from the native cultivators until December of that year; so it was not till the beginning of 1908 that a proper start was made.

During the first two years much of the time was spent in preparatory works, such as erection of farm buildings, boundary pillars, fencing and convenient roads. A few experiments, however, were carried out with various crops.

2. *Area, Elevation*—A survey of the farm was completed in April 1911 at a cost of Rs. 136-0-6 ; the plots were all numbered and the area computed. The total area exclusive of jhoras is 68·81 acres, of which 9·75 acres are occupied with roads, coolies, houses, farm buildings, waste grounds and under trees and bamboos, leaving 59·06 acres for cultivation. During the year under report 30 acres were under experimental cultivation, the remainder being partly cultivated under ordinary crops, and partly given to coolies on half-crop system.

The elevation is as follows :—

	Ft.
Lower Boundary	3,317
Farm Buildings	3,673
Upper Boundary	3,864

The level section through the farm from top to bottom shows an average gradient of 1 to 5. This is a very moderate slope for these hills, and gives a situation difficult to improve on for experimental works.

3. *Irrigation.*—The only irrigation necessary for the rice crop is obtained from the natural rainfall, and this consists of turning the water out of the many streams on to the rice terraces when required. In the winter no irrigation is possible, but few crops grow at that season. For vegetable and fruit culture during the winter and dry season irrigation is undertaken through pipes from two natural springs around which pucca stone vats have been built.

4. *Character of the Soil.*—The soil is a rich clay loam whose reaction is acid.

5. *Meteorology.*—The following table shows the normal rainfall for nine years and that of 1917 at the Demonstration Farm :—

Month.	Normal 9 years.		1917.	
	Rainfall.	Rainy days.	Rainfall.	Rainy days.
1917.	Inches.		Inches.	
January	0·30	1·04	0·01	1
February	1·08	4· 0	1·37	6
March	1·57	4·08	0·58	2
April	2·33	10·03	0·58	3
May	5·73	16·08	7·29	15
June	21·44	21·06	22·21	24
July	26·37	27·04	30·40	28
August	21·63	25·04	19·06	27
September	11·02	17·05	13·12	17
October	4·57	7·01	13·81	8
November	1·43	2·05	...	...
December	0·42	1·06	...	...
Total ...	97·89	140·04	108·43	131

1918.	Inches.	Rainy days.
January	...	...
February	0·62	4
March	2·46	8

The season 1917-18 was very dry during March and April, which was unfavourable for maize, as many areas had to be sown twice, *i.e.*, March and May, where poor results were obtained. Aus paddy and Nepalese soybeans also suffered in this way. The excessive rainfall in May to October was favourable for the rice, Marwa and buckwheat crops, while, on the other hand, all pulses suffered, due to heavy rains at the time of flowering.

6. *Operations during the year.*—(A) *General crops grown.*—The following table gives the area under each crop grown by the farm and on the half-crop system with the total outturn, yield per acre, cost of cultivation, price per maund (82 lbs.), and total value of crops :—

Crops.	Area in acres.	Outturn in lbs.	Yield per acre in lbs.	Cost of cultivation per acre.	Price per maund (82 lbs.).	Total value of crop.	Grand Total.
				Rs. A.	Rs. A.	Rs. A. P.	Rs. A. P.
Maize	21·75	50,266	2,311	38 0	2 9	1,570 13 0	1,789 14 6
Half crop maize ...	9·50	7,011	738	...	2 9	219 1 6	
Paddy (aman) ...	14·0	20,090	1.435	44 8	3 0	735 0 0	990 9 0
Do. (straw) ...	14·0	34,071	2,433	...	0 9	233 11 6	
Half crop paddy ...	0·62	455	734	...	3 0	16 10 0	
Half crop paddy straw ...	0·62	760	1,225	...	0 9	5 3 6	
Kodo (marwa) ...	6·0	10,742	1,790	47 8	2 8	327 8 0	507 8 0
Half crop kodo ...	8·0	5,904	738	...	2 8	180 0 0	
Ghaiya (aus paddy) ...	0·75	553	737	51 0	3 0	20 4 0	28 2 0
Do. straw ...	0·75	5,166	6,888	...	0 2	7 14 0	
Buckwheat ...	1·0	635	635	14 12	3 2	24 3 6	...
Bhatmas (soybeans) ...	3·70	2,316	625	24 0	3 2	88 4 6	...
Dal-Kalai	2·0	984	492	23 8	5 0	60 0 0	...
Gahat	1·0	543	543	20 0	2 8	16 9 0	...
Mashyem	1·0	205	205	22 0	3 2	7 13 0	...
Sugarcane gur ...	0 75	3,802	5.069	130 0	8 0	371 0 0	...
Potatoes	1·0	1,722	1,722	91 4	3 0	63 0 0	...
Khar thatching grass ...	1·06	6,314	5,956	15 0	0 8	38 0 0	...
Fruit culture	6·50	...	...	35 0	...	927 4 3	...
Vegetable culture ...	2·15	...	...	175 0	...	968 9 3	...

From the above figures it is evident that maize and kodo in rotation are the most economical crops for these hill-sides. Kodo, buckwheat, soybeans, kalai dal and other pulses are grown after maize on the same land in the one year, but none of the latter named crops are so popular as kodo. Jhaiya or *aus* paddy also does remarkably well on very open slopes on these hills when sown in rows. Aman paddy can also be cultivated on a profitable scale, if sufficient care is taken to see that irrigation is kept up constantly from the jhoras till the second week of October. It is also profitable to grow this on the half-crop system, and it compares very favourably with maize and kodo; the other crops, pulses, etc. give unsatisfactory results, and are not encouraged. Fruit and vegetable culture are very profitable, and these need much improvement yet.

B. Experimental work—

Primary—

1. Maize.
2. Winter Paddy (Aman paddy).

Secondary—

3. Autumn paddy (Aus paddy).
4. Kodo.
5. Buckwheat.
6. Soybeans and dals.
7. Sugarcane.
8. Miscellaneous, Fruit and Vegetable Culture.

(1) *Zea Mays—Maize—Makai—Bhutta* —In 1907-08 experiments were commenced with a view to improve the crops as grown in this district, and also to compare with foreign varieties. The latter after two years' trial with poor results were discontinued. Attention was then concentrated on the improvement of the local varieties by means of seed-selection.

The maize at the commencement was of a very mixed nature, containing seeds of all colours and required seed to seed selection. The first few year's trials, however, separated the crops into several varieties, and by the subsequent selection of the best cobs of each type, we have obtained five varieties fairly true to type, *i.e.*, yellow round, yellow flat, white round, white flat and red round. The present method of selection which is annually

undertaken on this farm to keep these fine varieties of maize seeds true to type is—in August, when the crop is ready for harvesting, a preliminary selection is made. Here the tallest plant bearing only one cob is harvested and stored apart from maize, other maize cobs from plants bearing two or three cobs or more. Then in the month of March, just before sowing, the new crop, these selected cobs are brought out of our maize storing shed and after the outer leaves are removed the final selection is made ; here six points are considered before its seeds are retained for seed purpose.

(1) To see that the seed lines run parallel from top to bottom without a break.

(2) That the seeds are well formed and are closely and very firmly set.

(3) That no foreign or mixed seed of a different colour is found in amongst the grains, apart from the variety that is being selected.

(4) That all the seeds at the two ends to a depth of an inch be removed, as here the seeds will be noticed very uneven and of all shapes and forms ; consequently only the centre is selected for seed.

(5) That there is no sign of weevils or smut or even mildewedness in amongst the grains in the selected cob.

(6) That the cob in every variety, after the grains at the two ends have been removed, except the red round maize, be found to be white ; there have often been cases when grains have been white or yellow, the cob inside is red.

To enable us to retain these fine types of maize varieties as true and heavy yielding, the above points are very minutely considered and recommended to the cultivators at our final selection.

The average outturn of maize on 11 acres of all varieties under experimental cultivation for the past few years is here given :—

		Mds.	srs.		lbs.
1909-10	... ...	21	21	or	1,764
1910-11	... ...	27	25	„	2,264
1911-12	... ...	30	9	„	2,478
1912-13	... ...	33	8	„	2,722
1913-14	... ...	30	30	„	2,767
1914-15	... ...	30	39	„	2,539
1915-16	... ...	31	36	„	2,615
1916-17	... ...	31	28	„	2,599
1917-18	... ...	28	35	„	2,367

These are remarkable figures and a striking illustration of the benefit to be derived from careful selection and preservation of seeds.

Seed was sown at the rate of 35 lbs. per acre between the 3rd and 4th weeks of March and manure applied at the rate of 175 maunds or 14,350 lbs. per acre. The crop was harvested from the beginning of the second week to the end of August. The proportion of grain to cobs with leaves attached was 51·50 per cent.

(*a*) *Varieties.*—The variety experiment has given the following results :—

Variety.		Outturn per acre.								
		1909.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.
Yellow round.	Mds.	19¼	29½	33¼	37	37¼	33¾	33⅝	29⅛	23
	lbs.	1,528	2,419	2,726	3,034	3,054	2,767	2,757	2,388	1,886
Yellow flat.	Mds.	37¼	36¼	36	31	26¾	22	29	30⅜	26
	lbs.	3,054	2,972	2,952	2,542	2,203	1,804	2,378	2,490	2,132
White round.	Mds.	26¼	32¾	33¼	29	33¼	37	35½	33⅞	34½
	lbs.	2,152	2,685	2,726	2,378	2,726	3,034	2,911	2,777	2,829
White flat.	Mds.	28¼	35½	29¾	41½	55	31¼	23¾	37¼	37½
	lbs.	2,316	2,951	2,439	3,403	2,870	2,562	1,947	3,054	3,075
Red round.	Mds.	19¾	30¼	31¼	37	30½	30½	36	32⅛	31
	lbs.	1,619	2,480	2,562	3,034	2,561	2,561	2,952	2,634	2,542
Sutton's giant.	Mds.	...	...	...	...	...	...	...	10¾	15¼
	lbs.	...	...	...	...	...	...	...	881	1,250

These figures are from one acre blocks, and the figures backed up by the average from the farm require no comment. The area under Sutton's giant maize had to be sown twice, as the first crop was destroyed by the drought in March and April.

(*b*) *Effects of terracing.*—To compare the result of growing ordinary crops (not irrigated paddy) on terraced and unterraced land. two acres were selected as uniform in fertility and slope as was possible to find on the farm. One acre was terraced at a cost of Rs. 107-5-6. Each plot received similar treatment, equal amounts of manure and seeds being applied.

The following table shows the outturn and cost of production of maize and secondary crops for the last seven years.

Terraced Acre.			Unterraced Acre.		
Crop.	Outturn.	Cost of cultivation	Crop.	Outturn.	Cost of cultivation.
1911-12.	lbs.	Rs. A. P.	1911-12.	lbs.	Rs. A. P.
Maize	2,706	40 1 3	Maize	3,181	41 11 0
Soybeans—			Soybeans—		
Grain	973	20 8 6	Grain ...	783	24 4 0
Straw	1,271		Straw ...	1,004	
1912-13.			1912-13.		
Maize	2,701	44 14 6	Maize	2,956	44 14 6
Kodo—			Kodo—		
Grain	1,824	49 6 3	Grain ...	2,009	52 15 3
Straw	Estimated Rs. 5.		Straw ...	Estimated Rs. 5	
1913-14.			1913-14.		
Maize	2,460	37 10 0	Maize ...	2,911	37 10 0
Kalai dal—			Kalai dal—		
Grain	410	25 0 0	Grain ...	389	25 0 0
Straw	553		Straw ...	410	
1914-15.			1914-15.		
Maize	2,566	37 9 0	Maize ...	2,933	38 1 0
Buckwheat (local) ...	358	14 9 0	Buckwheat (local) ...	369	14 9 0
1915-16.			1915-16.		
Maize	2,829	33 5 0	Maize ...	3,308	33 8 0
Soybeans—			Soybeans—		
Grains	410	22 8 0	Grain ...	287	22 0 0
Straw	912		Straw ...	676	
1916-17.			1916-17.		
Maize	2.675	36 0 0	Maize ...	2,798	36 8 0
Kodo—			Kodo—		
Grain	1,886	46 0 0	Grain ...	1,732	46 0 0
Straw	Estimated Rs. 5.		Straw ...	Estimated Rs. 5	
1917-18.			1917-18.		
Maize	2,747	38 0 0	Maize ...	2,644	38 0 0
Dal Kalai—			Kalai dal—		
Grain	481	23 0 0	Grain ...	502	23 0 0
Straw	984		Straw ...	1,025	

After seven years of experiments on these two areas it will be noticed that this year under report the terraced acre has for the first time given better results of the two in the maize crop, while, as the secondary crop kalai dal the unterraced acre has yielded the best results. It will be interesting to note in future which of the two areas will continue to give the highest yields.

The terraced acre has all the advantages and there is no reason why it should not continue to give the best results, now that it has made a start. The disadvantages and irregularities in these two areas have to some extent been removed this year, and we may be soon in a position to pronounce which of the two areas are most effective and profitable.

(*c*) *Manurial experiments.*—Three plots of ½ acre each have been reserved for this experiment since 1910-11. The condition of the soil in each plot is fairly uniform, and the situation of each plot is approximately at the same level.

The following results were obtained in 1917-18 with maize and marwa kodo in rotation :—

½ acre Plots.	Manure per acre.	Outturn of maize per acre.	Outturn of kodo per acre.
		lbs.	lbs.
1.	8,200 lbs. farm yard manure, and 164 lbs. superphosphate	2,378	2,173
2.	8,200 lbs. farm yard manure	2,132	2,071
3.	Unmanured	1,640	1,660

To test the value of nitrate of soda the following manurial experiment was undertaken with the results given below :—

		lbs.	lbs.
1.	12,300 lbs. farm yard manure	2,788 maize	1,761 kodo.
2.	6,150 lbs. farm yard manure and 50 lbs. Nitrate of soda	2,583 „	1,906 „
3.	Unmanured	1,640 „	1,619 „

The ordinary mule manure which we purchase at Rs. 1-11 per ton is the most economical and effective.

The yellow round variety of maize is extensively cultivated, and is a great favourite, being most profitable and popular with cultivators and merchants.

The white round is another favourite, and both these two varieties are made into maize meal or rice and eaten as porridge by the hill people as well as Europeans.

The red round is not cultivated much, although we find it one of our best yielders. There seems to be no market for it, and is chiefly given to poultry and animals.

The white and yellow flat varieties are very well known by the hill people to be heavy yielders, but there are a few who cultivate these two varieties in fairly large areas to sell the crop practically immediately after harvesting, as these two varieties get mildewed very easily, the thin ends of the cob being usually open, and are also very accessible to weevils.

The seed rate has again been reduced to 35 lbs. per acre this year, and it is to be hoped to make still a further reduction as time goes on, until we find that 20 lbs. per acre is sufficient. The quantity of 50 lbs. of seeds was usually applied per acre ; this was far too excessive which caused unnecessary thinning and a wastage of good seeds. It is surprising to note how the price of maize has remained stationary since the beginning of harvesting, *i.e.*, Rs. 2-8 to Rs. 2-12 per maund (82 lbs.), which is the lowest we have obtained for the past four or five years.

(2) *Oryza sativa—Winter Paddy—Dhan—Transplanted paddy.*—Owing to the proximity of this farm to the hill ridge a very limited space is left to act as a collecting ground for water, and the crop in consequence is almost entirely dependent on the incidence of rainfall during these months to ensure that continuous supply of water which is so essential for its growth. The seed-beds are sown by the third week in May, and transplanting commences by the end of June, and is completed by the end of July. The

harvesting takes place after fully five months of transplanting from the 3rd week of November to the 1st week in December.

The following table gives the area, outturn and yield per acre of each variety and experiments conducted on this farm during the year under report :—

Paddy 1917-18.

Varieties of experiments.	Area.	Outturn.	Yield per acre.
	Acres.	lbs.	lbs.
Elevation—			
Touli 3,317—3,450′	5·40	9,009	1,668
„ 3,550—3,650′	3·00	3,997	1,332
„ 3,500—3,675′	2·33	2,490	1,066
„ 3,675—3,750′	0·87	1,414	1,625
Variety—			
Touli	0·25	348	1,394
Ratomasi	0·25	307	1,230
Mansaura	0·25	389	1,558
Timarah	0·25	297	1,189
Dhanasai	0·25	369	1,476
Ramtulsi	0·25	256	1,025
Manurial—			
Touli (unmanured)	0·33	410	1,230
„ (green manured with soybeans) ...	0·33	481	1,445
„ 4,100 lbs. farm yard manured ...	0·33	317	953

Touli (which gives a large whitish grain) is the best yielder on the farm; consequently most of the paddy area was cultivated under this variety. A special seed selection is made annually at the time of harvesting on the fields, together with a careful watch kept on the jhoras; all these combined have again given fair results this year in spite of the extensive damage done by the army worm (*Cirphis Unipuncta, Haw*), during the second and third of September in the elevation experiment area (3,500 to 3,675 ft.) of 2·33 acres, also amongst the variety experiments which join the abovenamed area. The damage would have been very great had steps not been taken to destroy these pests from the commencement.

(*a*) *Effects of elevation.*—This experiment with Touli paddy has been taken in hand since 1915-16 for comparison as to what altitude paddy would do best on the farm and the surrounding hill sides, the results of which are as follows :—

Elevation Experiment.

Serial No.	Area in acres.	Approximate elevation.	Variety.	Outturn in grain straw.	Yield per acre.	Cost of cultivation.
				lbs.	lbs.	Rs. A.
1	5·40	3,317—3,450′	Touli	9,009G / 12,320S	1,668G / 2,279S	219 12
2	3·0	3,550—3,650′	„	3,997G / 7,441S	1,332G / 2,480S	110 14
3	2·33	3,500—3,675′	„	2,490G / 4,981S	1,066G / 2,134S	95 15
4	0·87	3,675—3,750′	„	1,414G / 2,378S	1,625G / 2.732S	32 13

During the past three years of this experiment it has been found that the lowest elevation area has yielded the best results in grain compared to the other areas.

(*b*) *Variety.*—The following table shows the figures obtained from 1916 to 1917 for the variety experiment :—

Variety Experiment.

Variety.	Outturn per acre.									
	1913-14.		1914-15.		1915-16.		1916-17.		1917-18.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Touli	861	2,624	1,189	2,788	1,533	2,111	1,720	2,378	1,394	2,624
Dhanasi	1,107	2,788	...	...	1,377	2,788	1,148	2,870	1,476	2,870
Mansura	1,107	3,116	861	1,968	1,500	2,738	1,392	2,460	1,558	2,952
Ratomarsi	758	2,132	861	1,968	1,238	1,992	1,064	2,624	1,230	2,788
Ramtulshi	717	3,280	656	2,296	1,558	3,058	1,188	2,952	1,025	3,788
Trimurah	963	3,075	451	2,952	1,525	3,140	1,064	2,706	1,189	3,788

From the above figures it is difficult to judge which is the best yielder. Some varieties require plenty of irrigation and ripen earlier, while others don't, and when the rainfall is heavy or light, as the case may be, the varieties either suffer or give good outturns. The Touli, a coarse variety, and Ramtulshi, a fine variety, are both good yielders, and their rice has a very ready sale. Although plain's rice is being sold up here at 10 to 12 seers per rupee, still there are about 75 per cent. of the hill and plains people who prefer to buy the hill rice which is sold at 5 to 6½ seers per rupee.

(*c*) *Manurial Experiments.*—During the past eight years an experiment has been conducted to note the effects of green-manuring, as compared with farm yard manure and an unmanured plot.

The results of the last three years are here recorded :—

Manurial experiment.

Manure.	Outturn per acre.					
	1915-16.		1916-17.		1917-18.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1. Unmanured ...	1,260	1,906	1,199	1,845	1,230	2,706
2. 4,100 lbs. farm yard manure.	1,107	1,672	984	2,214	953	2,952
3. Green manured (soy-beans).	965	1,580	1,322	2,091	1,445	2,583

From these figures there does not appear to be any advantage from manuring. Unmanured and green-manured areas always give better yields, than manured. It is never a practice to manure paddy areas on these hill-sides, as all the washings, etc., are always directed into the fields from the jhoras.

(*3*) *Oryza sativa—Autumn paddy—*(*Aus dhan* or *jhaiya*)*—Unirrigated paddy.*—This crop is usually sown broadcast on slopes thoroughly exposed to wind and air and well drained. On the farm it is sown in rows at 18″ and seeds dibbled in at 8″ apart.

The results of three years' experiments are given below :—

		Grain.	Straw.
		lbs.	lbs.
1915-16	1 acre plot	1,998	11,234
1916-17	„	1,8.0	8,745
1917-18	„	738	6,988

For the past two years there has been a gradual decrease in the returns due to the drought experienced at the early stage of its growth and the heavy rains at the time when the crop was coming into ear. This year, this crop was cultivated at a loss of nearly Rs. 14 per acre.

(*4*) *Elenusine—Coracana—Millet—Marwa—Kodo.*—This crop grows in rotation with maize and is transplanted from the third week in June to the end of July, so that when the maize crop is harvested in August, the kodo covers the land, having well developed in the interval.

The following table shows the average outturn per acre from 1913—1917 from 6 acres of land under marwa :—

	lbs.		lbs.
1913	2,255	1916	1,640
1914	1,886	1917	1,790
1915	1,909		

During these past three years an experiment has been couducted to test the yield between two varieties, the curly closed, and the open loose varieties of marwa, cultivated extensively on these hills, and the results obtained are as follows :—

Marwa variety experiment.

Year.	Variety.	Area in acres.	Outturn.	Cost of cultivation.	Value of crop.
			lbs.	Rs. A.	Rs. A.
1915-16 ...	Curly closed ...	1	1,763	43 8	80 4
	Open loose ...	1	1,906	47 0	86 6
1916-17 ...	Curly closed ...	1	1,804	45 0	65 8
	Open loose ...	1	1,937	47 8	70 0
1917-18 ...	Curly closed ..	1	1,829	48 8	56 9
	Open loose ...	1	1,968	49 0	60 0

Straw estimated at Rs. 5 per acre for grazing, and grain was sold as Rs. 2-8 per maund (82 lbs.) this year in comparison with last year which was sold at Rs. 2-12 per maund. The low price is due to the bumper crop being harvested all over. So far the open loose variety of marwa has given the best results, in spite of its shedding a good percentage of its grain before harvesting.

(*5*) *Fagopyrum Esculentum—Buckwheat—Phaphar.*—This crop is grown in rotation after maize, seed is sown in the beginning of September, and is ready for harvesting by the end of November or beginning of December. One acre was cultivated under this crop this year, and an outturn of 635 lbs. of seeds was obtained at a cost of Rs. 14-12, which was sold at Rs. 3-2 per maund of 82 lbs., giving a profit of Rs. 9-7-6.

(6) *Leguminous crops.*—The following crops belonging to this order are grown in this district and on this farm :—

Botanical name.	English name.	Nepali name.	Number of varieties.	Remarks.
Glysine hispida ...	Soybean ...	Bhatmas ...	5	Lepcha name Selliyan.
Phascolus mungo ...	Dal ...	Dal-kalai	2	
Ditto calcaratus ...	„ ...	Mashyem	3	
Ditto sublobatus ...	„ ...	Ditto ...	1	This species is often called Gurans.
Dolichos biflorus ...	„ ...	Gahat	1	

(*a*) *Soybean—Glysine hispida.*—The following varieties were grown on the farm of 1 acre plots and figures for the past six years are given below :—

Soybean.

Variety.	Area in acres.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.	1917-18.	Remarks.
		Grain.	Grain.	Grain.	Grain.	Grain.	Grain.	
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
Nepali Bhatmas	1	1,148	1,353	1,681	820	1,148	902	Whole season, crop grows alone.
Barmali ditto ...	1	410	1,066	697	410	861	543	Grown in rotation with maize.
Green ditto ...	1	369	1,066	727	164	922	410	
Chocolate ditto ...	1	779	1,189	799	635	820	656	
Black ditto ...	1	512	922	676	440	984	797	

The first two varieties are erect growing, while the last three mentioned are of trailing habits.

All these leguminous crops can be grown in rotation with maize. However, Nepali soybeans produce very little when grown along with maize, but when grown alone yields heavily. They cannot, however, compete with maize or marwa. The cost of cultivation of these crops was Rs. 24 per acre, except the Nepali variety, which when grown alone in the open cost Rs. 45 per acre. The value of the Nepali soybeans was Rs. 5 per maund (82 lbs.), and of the other varieties Rs. 3-2, except the black soybean, which was sold at Rs. 2-8 per maund.

(*b*) *Kalai Dal—Phascolus mungo.*—Two acres were sown with this crop and an outturn of 984 lbs. of grain was obtained, that is at 492 lbs. per acre. There is a great market for this seed, and the price varies from Rs. 4-8 to Rs. 6 per maund. The cultivators usually sow this crop on the ridges or ails of paddy fields.

(*c*) *Mashyem—Phaseolus calcaratus.—Phascolus sublobatus.*—The cultivation of this crop has been taken up again these past two years, and this year under report an acre plot was set aside for the purpose, and an outturn of 205 lbs. of grain was obtained from the two varieties. This experiment was conducted at a loss due solely to the heavy rains in September and beginning of October.

(*d*) *Gahat dolichos biflorus.*—An area of 1 acre was cultivated under this crop, and an outturn of 543 lbs. of grain was obtained at a cost of Rs. 20 ; the grain was sold at Rs. 2-8, incurring a loss of Rs. 3-8. The heavy rains from September to 1st week of October caused the decrease in the returns of all leguminous crops. Majority of these experimental areas had to be weeded twice to save the crops.

(7) *Sugarcane.—Saccharum officinarum.*—This crop takes 18 months to come to maturity on these hills as compared with 10 months on the plains. In April of 1916 a terraced area of ·50 acre was planted out with this crop, and increased by ·25 acre in April of 1917. From this area of ·75 acre an outturn of 46 maunds 15 seers (3,802 lbs.) of gur was manufactured or 5,065 lbs. of gur per acre, this being sold at Rs. 7 to Rs. 10 per maund. The cultivation expenses incurred during the year was Rs. 97-2, while the total receipts were Rs. 372 from sale of gur, giving us a clear profit of Rs. 366-8 per acre.

(8) (*a*) *Potatoes.—Solanum tuberosum.*—An area of 1 acre was planted out with this crop, with two varieties, the red and white (local Sikkim seeds), at a cost of Rs. 91-4 inclusive of cost of seeds and 8 maunds of castorcake. This area prior to potato cultivation had maize up to August, and no sooner this was harvested by the end of September the potato crop was planted. We had very heavy rains within a week, about 11 inches in 48 hours, and this rotted most of the tubers, and settled the soil to such an extent that it

made it difficult for the crop to sprout. In spite of these difficulties experienced, an outturn of 21 maunds (1,722 lbs.) of potatoes was harvested, which was sold at an all round price of Rs. 3 per maund. Another half acre was planted in February in the vegetable garden where the soil is rich and loose.

(*b*) *Fruit culture.*—Special care is now devoted to this section of our work on this farm, and an area 6·50 acres (of which 3·02 acres is under the Darjeeling Improvement Fund for supply of graftings, cuttings, etc., etc., to the cultivators in this district free of costs) is being cultivated with various kinds of fruit trees, such as local and Australian Navel oranges, numerous varieties of limes and lemons, guavas, papyas, pears, peaches, plums, apples, apricots, pineapples, loquats, pomegranate, cherries, bananas, tree-tomatoes, grenadillas (passion flower fruit) and grape vines. We have tried English fruit trees, but find they do not thrive at our elevation of 3,650 feet, a few Japanese and Australian fruit trees are being experimented with, and we have every hope of these succeeding.

Pineapples.—An experimental area of ½ an acre under pineapples of the "Queen variety" was planted in September 1912-13. The following results have been obtained during the past six years, since the time of planting to date :—

Year.	Cultivation expenses.	Outturn in pines.	Value.
	Rs. A.	As. P.	Rs. A.
1912-13 and 1913-14	102 10	54 at 2 6	8 7
1914-15	27 4	497 at 2 0	62 8
1915-16	31 0	1,002 at 2 0	125 4
1916-17	35 0	2,700 at 2 0	337 8
1917-18	44 0	3,570 at 2 0	446 4
Total ...	239 14	7,823	979 9

After deducting all expenses a profit of Rs. 739-11 is shown in six years. The sum of Rs. 82, which was included in the cost of cultivation for 1912-13, was charged for 1912 suckers at anna 1 each. These were not paid for by the farm, but they were taken from the Government gardens. This brings up the profit to Rs. 821-11 ; still further profits are expected from this half acre with little expenditure. This variety is much sought after by the villagers in and around Kalimpong, also people from various parts of India. From sale of fruits this year including pineapples, a sum of Rs. 927-4-3 was realised at a cost of Rs. 227-8, giving a substantial profit of Rs. 699-12-3.

(*c*) *Vegetable cultivation.*—On 1st March 1916 half an acre was put under vegetable cultivation, chiefly rainy weather crops, and after the maize crop had been harvested in August and the land cleared, an area of 2 acres was brought fully under vegetable cultivation. We have grown practically with success all kinds of English and Indian vegetables in large quantities, and have sold these to the St. Andrew's Colonial Homes, also in the local bazar at Tista Bridge and to visitors to Kalimpong, who have taken huge basket-loads down to their respective homes. No vegetables were sent to Calcutta to Sir Stuart Hogg market for auction, as we had a ready market in Kalimpong, while the homes had to fall back for their supply from this farm due to their crops being failures.

Two and a quarter acres were cultivated with vegetables this year under report, and besides the sale which amounted to Rs. 968-9-3 from vegetables alone, 23 maunds of maize which was sold at Rs. 2-9 per maund was also obtained from this area in the rains, while another half acre was taken over for potato cultivation in February, which promises to give a good result.

The expenses incurred including cost of manure seeds and cultivation of vegetables, maize and potatoes in this area amount to Rs. 477-8, leaving a balance of Rs. 550-0-3 as clear profit from sale of vegetables and 23 maunds of maize from an area of 2·25 acres. The reason for taking up this cultivation

on the farm is to introduce it amongst the raiyats of this Government estate, and to put them in the way of exporting their produce down to Calcutta at suitable times.

The following vegetable seedlings were sold to the cultivators under report :—

Cabbages, 5 varieties	...	2,400	at As. 12 per 100 plants.
Cauliflowers, 3 „	...	2,850	„ 12 „
Knolk holes, 2 „	...	650	„ 8 „
Sikkim Pea seeds	...	4 lbs.	„ 4 per lb.

This is the simplest and best method of inducing the cultivators to grow English vegetables, by raising a large quantity of seedlings, and selling these to them at reasonable rates, by doing so success may be achieved.

(*d*) *Receipts and Expenditure.*—A copy of the balance sheet for the year ending 31st March 1918 is given below :—

RECEIPTS.

	Rs.	A.	P.
Balance from 1916-17 ...	8	10	9
Government grant, 1916-17 ...	5,000	0	0
Sale of Farm Produce ...	5,663	12	6
Miscellaneous receipts ...	424	9	3
Bullocks	69	0	0
Total Rs. ...	11,166	0	6

EXPENDITURES.

	Rs.	A	P.	Rs.	A.	P.
Labour	3,132	7	3			
Superintendence	2,526	7	6			
				5,658	14	9
Miscellaneous, seeds, manures, repairs, postage, etc. ...				1,396	5	0
Bullocks				288	0	0
Capital outlay				900	0	0
Implements				49	5	9
Half crop to Homes... ...				2,831	14	3
Insurance Policy of Renewal ...				31	10	0
Balance in hand				9	14	9
Total Rs. ...				11,166	0	6

The total value of produce sold shows an increase of Rs. 974 from that of last year, inspite of the very low prices obtained for practically all agricultural seeds this year. The increase is due chiefly to the sale of vegetables, fruits and one or two other crops. The wages bill for monthly and daily labour shows an increase of Rs. 576-4-9, this is due to the all round increase in wages of the coolies at six pies per head per day, since April 1st 1917.

Capital expenditure.—In 1915-16 a strip of land in the very heart of the farm, comprising of 7·05 acres under orchard, etc., with a *kutcha* house in which the manager is living, was purchased at a cost of Rs. 10,750 plus an outlying portion of 0·91 acre from the farm area (in part payment). A contribution of (Rs. 2,375 plus Rs. 1,400) Rs. 3,775 was paid up to last year towards this purchase from the farm balance, and this year a further sum of Rs. 900 was contributed for the same purpose.

In addition, two other areas of 1·89 acres and 2·15 acres have since been purchased for Rs. 1,408 and Rs. 1,600 respectively, to enable us to straighten our boundary and put up a substantial barbed wire fence, as through these areas our farm crops generally suffered from stray cattle.

(*e*) *Acknowledgment and Training.*—We are again indebted to Mr. H. F. Green, Superintendent, Government Cinchona Plantation, for his kindness in valuing the farm stock. This on 31st March 1908 was valued at Rs. 1,637-14 as compared with 31st March 1917 Rs. 1,819.

During the year under report Dr. Sutherland with his senior boys and masters of the Normal School, visited the farm on various occasions for lectures and practical demonstrations. Miss. Smith and Miss. Mackintosh of the Girls' school also brought down their girls for these lectures, etc. Mr. H. R. Wilkinson, I.C.S., our late Subdivisional Officer and Mr. C. G. B. Stevens, I.C.S., our present Subdivisional Officer, took a keen interest in our work and recommendations, and through their encouragement a large number of cultivators and mondals of various blocks in Kalimpong attended lectures and practical demonstrations on maize seed selection (preliminary and final), fur making, and also on fruit and vegetable culture.

(*f*) *Seeds and implements supplied.*—The following list of seeds, etc. were distributed during the year 1917-18 :—

	Mds.	Srs.	or lbs.
Maize	34	15	2,810
Paddy and Ghaiya	3	10	266
Soy beans	3	25	297
Buckwheat	3	5	256
Dal	0	25	51
Kodo	1	20	123
Mashyem	3	35	313

Maize shellers	2 at Rs. 9 each.
Chaff cutter	1 „ 35

	Number.
Orange gooties	410
Lime and Lemon gooties	23
Plantain or Banana shoots	17
Pineapple suckers	3,502
Sugarcane cuttings	765
Papaya seedlings	148
Grenadilla seedlings	24

Now that a fruit nursery is being established on this farm, we hope to do good work amongst the hill people in fruit culture.

(*g*.) *Management.*—I was the manager in charge during the year. The lands for the farm was bought by the St. Andrews Colonial Homes, and is subject to an annual rental of Rs. 70-2. The farm is managed by the St. Andrews Colonial Homes, and the Bengal Government grant of Rs. 5,000 plus half sale proceeds is sufficient to pay for the up-keep of the farm. The remaining half of the sale proceeds is credited to the Homes I was in charge during the year.

The programme of work for this farm is drawn up in consultation with the Agricultural Department Bengal.

His Excellency the Governor of Bengal, Mr. W. R. Gourlay, Mr. J. A. L. Swan, Deputy Commissioner of Darjeeling, visited this farm.

Mr. F. Smith, Deputy Director of Agriculture, Bengal, Western Circle, inspected this farm in May and November 1917.

H. EDMUNDS,

Farm Manager, Kalimpong.

REPORT ON WORK DONE FOR THE PROVINCE OF BENGAL BY THE MYCOLOGICAL SECTION, AGRICULTURAL RESEARCH INSTITUTE, PUSA, DURING THE YEAR ENDING 31ST MARCH 1918.

(A) By the Imperial Mycologist.

1. *Ufra of rice.*—Evidence was obtained by pot cultures at Pusa and from a field experiment carried out in collaboration with the Bengal Department at Dacca Farm that this disease can be sometimes conveyed by seed from an infected crop.

The laboratory work at Pusa was directed chiefly to a study of the factors which enable or induce the parasite (*Tylenchus angustus* Butl.) to leave the water of the paddy fields and ascend the plant to reach the susceptible portion towards the top of the shoot. Of these humidity, temperature, light, and hunger were examined.

On glass slides the worm moves freely at a relative humidity of 95 (temperature 87° to 90°F.) but not at all at 90, the exact point being near 93. On the plant the lower limit is certainly below 90 but above 75, exact measurement being difficult.

At lower temperatures worms that have not recently fed are more sluggish than at higher. Well nourished worms taken directly after feeding show less difference. At high temperatures there is a much greater tendency to ascend paddy shoots, but here again freshly fed worms are less affected.

The influence of light is still under examination.

Starvation is a most important factor in increasing the tendency to wander. This factor must come into play as the crop ripens, the worms only feeding on the unripe plant. Ripening infected Aus paddy must therefore be a source of great danger to the neighbouring Aman crop.

Some further progress has been made in defining the limits of the infected tract. No new outbreak outside previously known areas was reported during the year, except a small extension towards Chittagong. Two fieldmen from Pusa examined the infected areas near Chittagong, in Faridpur, and in the Manikganj subdivision of Dacca.

The following demonstrations were carried out by the Bengal Department of Agriculture under advice from Pusa.

Dacca District.—(1) Bikrampur. About 58 acres were treated by burning the stubble and sown with either Aman or Digha paddy alone or with Aus and Aman mixed or with Aus followed by jute. The Aus paddy escaped, the Digha was very slightly damaged, but about 12 acres of Aman were attacked. The amount of loss was not reported.

(2) *Nagari.*—About 25 acres were treated as above. Ufra appeared in three acres only, but the amount of damage was not reported.

(3) *Pubail.*—A small isolated block, which has given little or no crop for several years, was treated as before. The disease appeared in one part only. The yield was about seven-eighths of a normal crop for the first time for a number of years. Another larger area was similarly treated, but the loss was about a quarter of the crop. It was not isolated from untreated infected paddy close by.

Faridpur District.—About 10 acres were treated as above at Gopalganj. No disease appeared until late in the year. Further reports have not been received.

A detailed account of the present state of knowledge of the disease has been written and it is hoped will be published during the coming year.

II. *Soil deficiency and Plant disease.*—The Imperial Mycologist is collaborating in an enquiry into this problem with Fibre Expert to the Government of Bengal. Work on *rahor* wilt has been planned and experiments started. The problem is referred to in more detail in papers in the special Congress number of the Agricultural Journal of India.

III. *Soft rot of ginger.*—This disease has been proved by artificial culture and inoculation to be due to the fungus *Pythium gracile Schenk*, previously suspected to be the parasite concerned. It has also been found to cause a serious disease of the stem of the papaya and to attack seedlings of tobacco.

(B) By the second Imperial Mycologist.

I. Black band disease of jute.

During the rains of 1917 an area of about 40 acres of jute (Corchorus capsularis) were grown on the Pusa Farm as a seed crop for the Fibre Expert to the Government of Bengal. The variety grown was that called "kakya bombai" and about half the area was sown in March and the remainder in June. The early sown portion of the crop grew well, but about the beginning of August a number of plants appeared to be drying up, the leaves falling to the ground and the stems blackening. Inspection of the crop showed that this disease commenced with the formation of a black patch on the stem at a point from 1½-3 feet above the ground level. This black patch spreads rapidly, forming a discoloured band round the stem, about 4-12 inches long. At this stage the leaves of the plant droop and fall and the black band extends up and down the stem, until finally the diseased plant is left simply as a blackened stick.

Examination of the surface of a diseased stem showed the presence of large numbers of *pycnidia* of a fungus which proved to be identical with that known as *Diplodia Corchori* (*Syd.*). This fungus was first collected as a

parasite of jute on Pusa farm in 1910, but until the present season there was no reason for suspecting it of being more than an occasional parasite. As, however, the crop ripened the disease increased until it was estimated that about 20 per cent. of the crop was infected. The fungus was obtained in pure culture and inoculations upon healthy plants succeeded in establishing the disease and proved the parasitism of the fungus.

Inspection of the jute seed crop in other parts of Bihar showed that the disease was in 1917, widespread, and as the Bihar seed crop was intended for seed distribution in the jute growing districts of Bengal, suggested the advisability of disinfecting this seed before sending it to Bengal. The fact, however, that an examination of old specimens of jute in the mycological herbarium at Pusa showed that this fungus had, during the past 10 years, been collected, but not indentified nor suspected of parasitism, over a large area in Bengal indicated that there was no danger of introducing a fresh parasite to the jute growing districts. Nevertheless, as the seed was being distributed very extensively by the Bengal Department of Agriculture, it was decided to disinfect it. The problem of disinfecting the jute seed resolved itself into discovering some method of treatment, which would kill those spores of the fungus which became mixed with the seed during threshing, without injuring the germination of the seed. Experiments showed that steeping for 10 minutes in a 2 per cent. solution of copper sulphate could be relied upon to inhibit the germination of the fungus spores, without appreciably affecting that of the seed. The whole of the Bihar seed crop was therefore collected in Pusa and steeped in a 2 per cent. solution of copper sulphate for 10 minutes and the seed then carefully dried on a concrete threshing floor. The work was carried out during the first three weeks of January and the seed at once bagged and despatched to Dacca, a total of about 20 tons of seed was treated in this way.

Early in November the jute seed crop in Kamrup was inspected and found to be suffering from *Diplodia Corchori*. This seed was collected and treated at Dacca. A fact which was apparent both in Bihar and Kamrup was that the late sown crop was relatively immune from attack. All field observations suggest that in some way the incidence of the disease is dependent upon the host plant reaching a certain stage of maturity and size and thickness of stem. Field and laboratory experiments are being continued at Pusa with the object of elucidating the conditions which favour the spread of the disease and any further methods of control. Further observations and experiments on Rhizoctonia on jute and its relation to this new disease are also being carried out.

II.—Root rot of the sal tree.

The inoculations carried out at Dehra Dun on young sál trees have not yielded any results and a further series of infections, using pieces of fresh sporophores of Polyporus shoreae, is being arranged in collaboration with the Forest Botanist. The figures obtained during the past year in the fungus observation plots at Rajabhatkhawa, show a number of new attacks but a relatively low proportion of fresh deaths.

E. J. BUTLER,

Imperial Mycologist.

REPORT OF THE MYCOLOGICAL COLLETOR BENGAL, FOR THE YEAR 1917-18.

I was on tour for 120 days during the year under review.

I visited Chaumuhini, Lakhipura (Noakhali), Bikrampur, Kurmitola, Pubail, Nagari, Manickganj (Dacca), and Gopalganj (Faridpur) in connection with Ufra or Dak (Eelworm) disease of paddy, and Bankura to investigate smut disease of sugarcane.

I also attended the Provincial Agricultural Conference held in Calcutta.

On tour most of my time was spent in supervising the remedial measures for Ufra that were started in different centres, viz., Kurmitola, Pubail, Nagari,

Bikrampur and Gopalganj to test the effect of the preventive measures as already recommended, *i.e.*, (a) burning of stubble, (b) thorough cultivation, (c) sowing of disease free seeds.

The result of the experiment is as follows :—

(1) *Kurmitota* :—The experiment was repeated like last year. No disease appeared this year too, though it occurred in the vicinity.

(2) *Pubail.*—The same experiment was repeated. The disease appeared in one patch. The damage was much less than last year. Last year the whole crop was damaged.

At Pubail another block in the vicinity of a khal (water way) that suffered much from Ufra in the previous years has been deepened and converted at the expense of Government into Boro land, and Boro paddy has been grown. This method is practicable only near khals where irrigation is possible.

(3) *Nagari.*—Twenty-five acres in 4 Blocks were selected in open country where infection can spread from one field to another. The disease more or less appeared in all the blocks and the crop of about 3 acres out of 25 was damaged by Ufra. The extent of damage is much less than last year.

Besides this, at Nagari Digha paddy that is said to be immune owing to its early ripening was sown side by side along with deep water Aman paddy, that is more susceptible to the disease.

The land was prepared after burning stubble. The disease neither occurred on Digha nor on Aman paddy though it broke out in the vicinity.

(4) *Bikrampur.*—Fifty-eight acres in 5 blocks were selected in open country.

Stuble was burned, land ploughed as usual and seeds according to local practice, either mixture of Aus and Aman paddy, Jute and Aman paddy, Digha and Aus paddy, or Digha or Aus paddy alone were sown.

The Aus paddy was free from the disease as the crop had been reaped before the disease appeared.

In two plots Rangi digha was partially attacked by Ufra but the damage was slight.

The Aman paddy more or less was attacked by Ufra in all the blocks The crop of about 12 acres out of 58 was damaged. The damage is comparatively much less than last year.

(5) *Gopalganj.*—Here 10 acres were taken in two different centres. The mode of cultivation was same as in Bikrampur. The disease appeared in both the places. About two annas crop was damaged by Ufra.

The intensity of the disease this year in this tract was much less than the last few years.

Conclusion.—From the above experiments it appears that thorough burning of stubble and clean cultivation reduces the disease to a considerable extent, though it is not exterminated in open country where infection spreads from fields where the land does not dry out sufficiently to permit of burning stubble and ploughing until February or even March in many cases.

Dacca Farm Experiment.—Ufra infected paddy brought from an infected area was sown with a view to test whether the disease is carried by the seed. Observation was taken at intervals and Ufra broke out in middle of September, and about four annas crop was finally damaged.

A few bundles of deep-water paddy seed from a few infected localities were examined. Pubail and Lakhipura seed revealed Ufra.

Other work.—As routine work farm crops were regularly kept under observation. The following fungoid diseases were observed on the Dacca farm in the year under review :—

Rhizoctonia on Jute.	Colletotrichum on Sugarcane.
Ditto on Cowpea.	Ustilago on Sugarcane.
Uromyces on Cowpea.	Oidium on Gourd.
Colletotrichum on Cowpea.	Uredyfici on Fig,
Oidium on Cowpea.	Capnodium on Mango.
Ditto on Til.	Cystopus on Amaranthus.
Peronospora on Mustard.	Peronospora on Garden Pea.
Colletotrichum on Agave.	Oidium on Garden Pea.

Forty-eight thousand eight hundred and eighty four sugarcane sets were selected for the Dacca farm and treated in copper sulphate solution before planting.

AMRITA LAL SOM,

Mycological Collector, Dacca.

REPORT OF THE ENTOMOLOGICAL COLLECTOR, BENGAL, FOR THE YEAR 1917-18.

During the year I was on privilege leave for 57 days. I spent 25 days on tour and visited the following places :—

September.—To Kurmitola and Pubail to investigate Ufra disease of paddy.

To Suri to investigate Rice Gall Fly (*pachydiplosis oryzae*).

January 1918.—To Calcutta to attend the Provincial Agricultural Conference.

To Faridpur to attend the Agricultural Exhibition.

To Naogaon to demonstrate spraying of Vermisapon Special K on *ganja* for Red spider.

March.—To Bagila (Burdwan) to investigate the Potato moth (*phthorimaea operculella*) and suggest remedial measures.

The chief items of work are noted below :—

Observation and treatment of the crop pests on the Dacca Farm.

The important pests observed are the following :—

Behar Hairy Caterpillar (*diacrisia obliqua*).

Jute Semilooper (*cosmophila sabulifera*).

Large brown cricket (*brachytrypes achatinus*).

Moth borer (*diatraea sp.*).

White moth borer (*scirpophaga auriflua*).

Mango shoot borer (*alchides frenatus*).

The litchi mite (*eriophyes sp.*).

Mango tree borer (*batocera rubra*).

Mustard aphis (*aphis brassicæ*).

Mango hopper (*idiocerus sp.*).

Mango weevil (*cryptorhynchus gravis*).

Pulse Beetle (*bruchus sp.*).

White ant (*termes sp.*).

Spraying, bagging, handpicking, fumigation, etc., were resorted to to check the ravages of the above insects where possible. A short note on a campaign made against the Behar Hairy Caterpillar (*diacrisia obliqua*) is given below.

The Behar Hairy Caterpillar, which was very bad on jute throughout the Dacca district, appeared in very large numbers on 28·45 acres of jute grown on the farm. The first brood, which appeared in the middle of June on a few bighas of farm jute sown early when the neighbouring cultivators' jute was also sown, was completely checked by handpicking of eggs and swarms of young caterpillars. The caterpillars which came in swarms from outside, were also killed by trenches filled with water and little coaltar and by handpicking.

The second brood appeared in the middle of July and it was extremely bad on the farm jute sown late and consequently more tender than outside jute. Though picking was commenced from the eggstage and thus several thousand bucket-fuls of leaves with eggs and young caterpillars were destroyed, this brood could not be kept in complete check as the area was so

large that about 100 coolies were engaged daily on an average when the pest was worst. However the major area was saved. Most of the caterpillars were killed by handpicking, trenching, laddering and beating the migrating caterpillars with branches of trees. In the latter part of August large numbers of parasites and predaceous insects were observed—a pentatomid bug (*Canthecona furcellata*), the common yellow wasp *polystes* (*predators*), two species of *hymenopterous pirasites*, and one *tachinid*. These also played an important part in checking the pest.

The third brood, which was very small, appeared in the latter part of August. It was easily kept in check by handpicking. An important point has been noticed that the caterpillars do not migrate at midday or at night which is of great advantage to the cultivators.

During the outbreak of this jute-pest a meeting of the Co-operative Rural Bank members of the surrounding villages, presided over by the Collector was attended. They were explained the life history of the pest and remedial measures.

Sugarcane borers.—At the harvest time very careful observation was made in collaboration with the Mycological Collector of all the district canes grown at the Dacca Farm with regard to insect pests and diseases and a statement was prepared. It has been found that thin and hard varieties of cane were much less attacked by borers. Of all the canes *Red Mauritius* was very badly attacked.

The Red Spider on ganja *at Naogaon.*—Spraying with vermisapon special K was demonstrated as it was found effective.

The Mango weevil (*cryptorhynchus gravis*).—The time and manner of egglaying of the mango weevil has for long been unknown. It has lately been found that early in April the eggs ($\frac{1}{2}$ mm. long and $\frac{3}{10}$ mm. broad) are laid singly on the fruits and they are covered with hard black coatings above, which look like black spots. The egg hatch into a grub (1 mm. long and $\frac{1}{5}$ mm. broad) inside and it bores into the fruit and then the outside covering falls down, and a very minute hole is seen which heals up afterwards. A complete plate of the weevil is being drawn for reproduction.

Mound-making termites (*white ants*).—This pest is of great trouble on the roads, lawns and in houses.

Various insecticides, such as carbon bisulphide, chlorine gas, etc., were tried to kill the nests but to no effect. At last Arsenic-trisulphide was used by means of the "Four oaks" white ant fumigator, and it was found quite successful. The machine which cost Rs. 60 and the insecticide may be had from the Planters' Stores Agency Co., Ltd., 11, Clive Street, Calcutta.

Exhibition.

In the Agricultural Exhibition at Faridpur important crop pests were shown and life histories were explained to the people. The use of Entomological appliances such as fieldbags, spraying machine, and white ant fumigator was demonstrated. Short lectures on insect pests and remedial measures illustrated by magic lantern were delivered. Leaflets on insect pests were also distributed.

Parcels.

A number of parcels of specimens of insect pests were received and reported on.

Publication.

A pamphlet on jute pests entitled "Pater" poka was published in Bengali for distribution.

PROFULLA CHANDRA SEN,
Entomological Collector, Dacca.

ANNUAL REPORT ON SERICULTURAL OPERATIONS FOR THE YEAR 1917-18.

The general control and the usual management of the whole operations in Bengal continued in the hands of the Bengal Silk Committee, consisting of the Director of Agriculture, Bengal (President), with the members, the Collectors of Malda and Murshidabad, Mr. Malcom, Mr. deMinvielle and the Hon'ble Mr. G. H. C. Ariff.

During the period under review, the Committee held three meetings.

Administration.

I remained in charge during the year.

Mr. Probhat Chandra Chowdhury, Superintendent of Berhampore Central Nursery, was in charge of the Cross-Breeding Experiments in addition to his duties.

Disinfection of village rearing-houses and raising seed necessary for the province, as far as practicable, through the selected rearers, as done at France, Italy, Japan and China.

The disinfection of village silk worm seed-rearing-houses, which was introduced by me since the year 1910 has been carried out most successfully. The popularity of the selected rearers' seed being much increased, they sold their seed from Rs. 2 to Rs 5 per Kahon.

Supervisors, under the supervision of the Nursery Superintendents, were employed to disinfect with strong Copper-Sulphate solution, and fumigate the rearing houses and furniture, etc., of the "selected" professional rearers who reared microscopically examined seed in the same way as is done in the Nurseries. If any portion of the seed goes bad accidentally owing to unusual weather or by any negligence, the sale of the same as seed is prohibited in their own interests. If this be continued slowly to give them a practical knowledge, in time they will undoubtedly improve.

Copper Sulphate worth Rs. 89-5-9 for disinfection and Sulphur worth Rs. 218-9-9 for fumigation were supplied to the rearers from the Malda Sulphur godown at cost price with necessary instructions.

Tours.

I spent 244 days on tour and inspected the Nurseries as often as possible.

The points which specially engaged my attention were as follows :—

(1) The production of disease-free seed from the Nurseries and from the "selected" professional rearers' houses, (2) comparison between the results obtained from the Nursery seed with those obtained from the "selected" rearers' seed (3) whenever I visited the "selected" rearers' houses during the crop or spinning of their worms, every time I called their neighbours to show them the results practically obtained, and as a result of which they can now thoroughly understand the difference between their method of rearing in the old fashioned dark houses from ordinary village seed with those from the examined seed in the improved houses as done in the Nurseries, and of adopting the same methods they now see practically done, (4) thorough disinfection of the Nursery houses as also of the "selected" rearers' houses and the furniture, etc., used in them, (5) the improvement of mulberry lands attached to the Nurseries by manuring and good cultivation, to increase the production of Nursery seed as far as practicable, (6) the extension of the area of mulberry lands, (7) the planting of "selected" mulberry in the lands attached to the Nurseries and supply cuttings to the ryots, (8) the improvement of the ordinary village rearing houses by adding ventilators and windows for light, air and dry floors and (9) improvement of mulberry lands in the Birbhum district by a mixture of river sand in the rocky soil, which has been practically proved

to be most successful at the Kalitha Central Nursery after experimenting in my private garden in a rocky soil, which is being introduced in the village rearers' lands.

Inspection.

The Director of Agriculture, Bengal, inspected some of the Nurseries twice during the year.

The Collector of Malda occasionally visited the Piasbari and Amriti Central Nurseries.

The present condition of the silk industry in Bengal.

Since the year 1910 the price of Home reeled silk has risen slowly, owing to the high market all over India, especially at Nagpur, Madras, and South Maharatta (Bombay). During the period under report the price rose from Rs. 20 to Rs. 25 per seer of silk, while green cocoons were sold up to Rs. 70 per maund, the highest price attained during the last 32 years in Bengal. There has been, in consequence, a considerable increase in the area of mulberry lands all over Bengal.

Nurseries.

The following is a list of the Nurseries in operation during the period :—

(1) Berhampur Central Nursery, containing seven rearing houses with 69 bighas, four cottas and ten chittaks of mulberry lands, which has been entirely devoted for experimental purpose since February 1918.

(2) Piasbari Central Nursery, containing five old big rearing houses and a half (small) rearing house of mat walls to keep up seed for supply to all other Central Nurseries and rear more seed with 67 bighas, four cottas and 12 chittaks of mulberry lands of which four bighas are "selected" mulberry planted at every three and four feet apart and 2 bighas more "selected" mulberry planted at every 5 feet apart during the period. This is the only Nursery containing many tanks and ponds from which the weeds have mostly been used as a heavy manure for mulberry lands.

(3) Amriti Central Nursery, containing 4 old big rearing houses and two small (half) rearing houses of mat walls, to rear more seed during the favourable seasons, while the growth of mulberry is more and production of mulberry is being increased by heavy manure of Castor Cake as much as funds permit as a very little cowdung is locally available.

Of the 83 bighas and 15 cottas of mulberry lands, 1 bigha 15 cottas "selected" mulberry (Punjabi variety) have been planted during the period at every 5 feet apart and 150 selected mulberry cuttings have been planted on the edge of the road side around the mulberry lands to grow as tree mulberry.

(4) Kumarpur Central Nursery, containg 4 rearing houses with 38 bighas 7 chittaks and 3 gondas of mulberry lands of which 7 bighas are planted with "selected" (Punjabi variety) of mulberry at every 3 to 5 feet apart and during the period 6 bighas of old Deshi mulberry were uprooted and planted with "selected" mulberry at every 4 feet apart.

(5) Chandanpur Central Nursery, containing 4 rearing houses with 41 bighas, 1 cotta and 4 chittaks of mulberry lands of which 18 bighas of old Deshi mulberry were uprooted and planted with "selected" (Punjabi variety) of mulberry at every 4 and 5 feet apart.

(6) Kalitha Central Nursery, containing 4 rearing houses with 51 bighas, 13 cottas and 10 chittaks of mulberry lands, of which during the period about 10 bighas of old Deshi mulberry have been uprooted and planted with "selected (Punjabi variety) of mulberry at 4 and 5 feet apart.

This soil of the Nursery was always too hard and rocky, being near the hills, and good digging and ploughing were impossible during the dry seasons. The results of my experiments of dressing the rocky soil with river sand being approved and sanctioned by the Director of Agriculture, the whole mulberry lands have been much improved and the purchasers of seed during

my last visit admired the growth of mulberry. Over and above this, the use of castor cake as manure just sanctioned will enormously increase the production of mulberry.

(7) Mirgunj Central Nursery, consisting of 61 bighas, 16 cottas and 8 chhitaks of mulberry lands. The land is still poor and although being improved by heavy castor cake manure, I doubt if the lands can ever be permanently improved by heavy manures, being situated on a low level which goes under rainy water every year.

(8) Bogra Nursery, containing six small rearing houses with 29 bighas, 15 cottas and 12 chhitaks of mulberry lands.

Exchange of seed between the Nurseries.

Piasbari Central Nursery was started in order to supply pure Nistari seed to all the Central Nurseries in the other districts during the whole of the summer season, while Mirgunj Central Nursery is supplying the Nistari seed to Piasbari Central Nursery and sometime to Amriti Central Nursery.

The Bogra Nursery was started for supplying pure and disease-free Chhotopoloo seed, to all the Central Nurseries and to take its seed from the professional rearers' houses to whom Nursery seed were supplied. Since last year, however, the rearers from other districts entirely stopped going to Bogra to purchase Chhotopoloo seed, owing to the silk industry having almost totally disappeared from Bogra for jute cultivation and the exorbitant high rate of labour (from 7 to 12 annas per day per head). The rearers in consequence have become suspicious of seed from the Bogra Nursery. Last year, I had to rear the Bogra Nursery Chhotopoloo seed for a crop at the Kalitha Central Nursery and then issue to other Central Nurseries.

The red soil of the Kalitha Central Nursery is somewhat like that of Bogra, and I have therefore submitted proposal to transfer the work of keepingup of the Chhotopoloo seed to the Kalitha Central Nursery separately, in two rearing houses in charge of an Assistant Superintendent, and to add a similar area to the Kumarpur Central Nursery. This proposal if approved, will save much money.

Supply of Nistari and Chhotopoloo seed.

Pure bred Nistari and Chhotopoloo disease-free seed was reared in all the Central Nurseries (except occasionally at the Berhampur Central Nursery) and the outturn was mostly sold as seed-cocoons and eggs, which have been invariably very highly appreciated by all ryots for the continued successful results they have obtained. The rush of purchasers are so much at times that we cannot supply the demands of all the rearers, and although during each crop I try to raise the price as high as up to Rs. 8 per *kahon* during the period, the purchasers are never backward to pay.

The total receipts from the outturn of nurseries from 1st July 1917 to 31st March 1918, were as follows :—

Details of head.	K.	P.	G.	Rs.	A.	P.
Sale proceeds of seed-cocoons	7,436	11	8	28,177	9	6
Ditto Cocoons	2,342	9	1	2,884	2	3
Ditto Pierced cocoons ...	438	5	12	168	12	3
Ditto Rejected cocoons ...	178	10	0	71	15	6
Ditto Mulberry leaves ...	...			1,132	9	0
Ditto Miscellaneous	...			127	9	0
Total ...	...			32,562	9	6

The figures for the two previous years are as follows : —

	Rs.	A.	P.
1915-16	16,828	8	4
1916-17	28,737	3	10

In comparing the last three years' figures given above, it will be seen that there has been a great increase in the production of seed and revenue, and this is entirely due to opening of the Piasbari and Amriti Central

Nurseries, which have given a revenue within a period of nine months, from 1st July 1917 to 31st March 1918, Rs. 11,058-1-6 and Rs. 7,789-11-9 respectively. These two central nurseries represent more than half of the revenue during the period under report.

The details of the sale-proceeds of the outturn of each central nursery during the period under report are shown bellow :—

Name of nursery.	Seed.	Cocoons.	Pierced cocoons.	Rejected cocoons.	Mulberry.	Miscellaneous.	Total sale proceeds.
	K. P. G.	K. P. G.	K. P.	K. P. G.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Piasbari	2,004 5 15	204 5 0	108 12 0	14 0 0	...	52 10 0	11,058 1 6
Amriti	1,693 0 12½	350 9 0	63 8 0	35 0 0	45 0 0	48 8 0	7,789 11 9
Berhampur	694 11 18¼	1,089 4 0	54 12 0	54 9 0	575 6 0	1 0 0	3,410 15 0
Kumarpur	986 12 9	8 0 0	19 4 0	26 0 0	194 12 0	6 0 0	3,296 2 9
Chandanpur	540 6 10¾	267 1 0	27 13 0	26 9 0	190 0 0	4 3 0	2,449 11 6
Mirganj	771 6 0	135 10 0	36 14 0	19 0 0	.....	.....	1,811 8 9
Kalitha	686 12 13	69 0 0	45 12 0	3 8 0	98 7 0	.....	2,311 5 3
Bogra	60 4 0	218 12 1	49 10 12	.....	39 0 0	.....	419 13 0
Sadar	.....	.....	.....	.....	.....	5 4 0	15 4 0
Total ...	7,436 11 8	2,342 9 1	438 5 12	178 10 0	1,132 9 0	127 9 0	32,562 9 6

The only way of doubling or tripling the production of nursery seed is (1) extension of mulberry lands, (2) heavily manuring the mulberry fields, (3) finding out some sure remedy or preventive for the attack of "Tukras" which ruins a whole crop of mulberry in the lands attached to the nurseries and (4) construction of a few more cheap sort of "Tatti" rearing houses, as was done year before last at Piasbari and Amriti Central Nurseries.

The total expenditure of the nurseries, including the office establishment from 1st July 1917 to 31st March 1918, are as follows :—

Details.	Amount. Rs.	A.	P.
Salary of the Superintendent of Sericulture, Bengal ...	4,300	0	0
Travelling allowance of the Superintendent of Sericulture, Bengal	1,208	15	6
Pay of the establishment	16,860	9	6
Travelling allowance of the establishment of Superintendent of Sericulture, Bengal	2,483	6	6
Stipends	351	3	6
Petty Construction and Repairs	2,662	13	6
Rates, Rents and Taxes	1,478	10	8
Rewards to Nursery men	406	0	0
Cultivation	25,693	8	6
Disinfection	754	6	9
Miscellaneous	4,894	0	4
Total ...	61,093	10	9

Training of the sons of Professional Rearers.

Sericultural instruction was continued at the Rajshahi Sericultural School from which 10 students have successfully passed during the year.

All the passed students have constructed their Model Rearing Houses and some of them have been most successful in rearing seed and selling their outturns as seed.

Industrial Exhibition.

Sericultural Exhibits were shown at the Suri Exhibition, where the Superintendent of Sericulture, Bengal, was present with the Director of Agriculture, Bengal.

A. C. GHOSE,

Superintendent of Sericulture, Bengal.

REPORT ON THE WORK DONE AT THE SERICULTURAL RESEARCH STATIONS—BERHAMPORE, KURSEONG AND KALIMPONG DURING THE YEAR 1917-18.

Introductory.

Monsieur E. Grangeon formulated the principles of these researches in December 1913 and made various crossings between the indigenous Nistari silkworm race and foreign races of superior qualities. Monsieur Grangeon clearly defined the object and stated that the evolution of multivoltinemongrel races of silkworms yielding more silk than the Nistaris should be the aim. As a concession to the prejudices of the Bengal rearers he advocated the establishing of types of silkworm races which would yield yellow cocoons like the indigenous Nistaris. He also laid it down that the worms of these new types should exhibit the larval appearance similar to Nistaris. In fact the aim was the substitution of local races by cross races yielding more silk but strictly keeping to indigenous types. Detailed description of the crossings and also of their respective history had already been submitted in my previous reports. Since Monsieur Grangeon's deparature to the front in August 1914, I have been in charge of this section. I have tried to carefully adhere to the principles laid down by him.

Importance of Selection.

One of the immediate effects of hybridisation is to increase and even induce variability. Variation furnishes suggestions of valuable tendencies. By the adoption of careful selection the breeder can turn these to his advantage. But much depends on the primary choice of the varieties to start with.

Whether crossings will lead to new characters is a much discussed problem. There is no doubt, however, that new races and new varieties may originate in this way. In many cases the hybrids simply owe their character to a new combination of qualities. The combination of these characters can be induced along definite or indefinite lines. A clear knowledge of the different varieties employed is essential. The researches of Monsieur F. D. Lafont had already elucidated many important points prior to Monsieur Grangeon's arrival here. These datas had no doubt been of great help to Monsieur Grangeon in the selection of his primary requisites. To him the credit of this important step is mostly due.

M. Grangeon did a number of crossings between various races and after strenuous selection continued throughout these years, we have been able to derive several types satisfying most of these conditions. But it is yet premature to be quite definite of success. There is a wide difference between the experimental and the field scale.

Items of Selection.

Some idea of the nature of selective measures adopted by us may be obtained from the following list. These are only a few, there being many other points which are suggested by observation in the course of practical working. All these heads of selection were not adopted from the beginning. But as many variational features were observed gradually with the progress of this work I have brought up the standard of selection to this present length.

(1) *Cocoons.*—Selection for colour, feel, shape and general aspects.

(2) Selection for yield of silk per cocoon with a view to exclude poor yielders from breeding.

(3) Reeling tests for comparing the different types.

(4) *Moths.*—Selection for general appearance of the moths and the rejection of the layings of any deformed or abnormal ones.

(5) Selection for disease by microscopic examination of the moths and the rejection of the layings of diseased ones.

(6) Selection for longevity so as to exclude the layings of short-lived moths.

(7) Selection of layings with a view to reject irregularly laid layings and also those not showing the standard number of eggs per laying.

(8) Selection for change in the colour of eggs from the period of the laying of the eggs to the hatching out of worms, so as to insure proper multivoltine character by preserving only those layings which change colour similarly to the Nistaris. This point was added to our selection list since last year, as I had mentioned in my report, owing to atavism on the part of a large number of eggs towards univoltinity. By careful selection and working it out on a sufficiently large scale the efforts in this direction have been successful.

(9) Selection for adherent and non-adherent characters of the eggs.

(10) *Larvae.*—Rearing of the stock races by the method of rearing several layings by families and the rejection of any family showing irregularities in moulting or not coming up to the mark as regards the vigour of the worms.

(11) Selection for larval markings and the isolation of the variants.

From the above list an idea can be made of the importance of selection and isolation in our research opperations. "Isolation," as observed by Darwin, "is the corner-stone of the breeder's art". The breeder has to be constantly on the look out so as to prevent any of his pedigree productions from intercrossing with any other stock. The principles of Segregate breeding or in other words discriminate isolation, is conducive to variability. Monsieur Grangeon laid much stress on a systematic and methodical selection with a view to keep to the best standard. The discriminate isolation of desirable characters is very carefully followed in each case.

Results obtained.

By adopting this rigorous system of continual selection in all stages, we have been able to bring our several cross races to be exactly similar to the Nistaris in general appearance. The Nistaris yield on an average about one grain of silky substance per cocoon. Our cross types are yelding an average of two to two and half grains of the same per cocoon. Cases of cocoons showing even three grains of silk in the same rearing are not rare. So that an improvement is manifest.

It is wellknown that much depends on the quality of the leaves given to the worms for feeding. There exists a distinct correlation between the yield of silk and the nourishment supplied in the nature of the food-stuff. So that in order to establish an exact comparison between different races it is necessary to consider the results obtained by feeding the worms with the same quality of the leaves. It can also be said that each plot does not offer the same nourishment to the plants. Manifestly, therefore, the problem of comparing carefully entails the necessity of a close study of the various correlative factors so as to insure accuracy.

Nourishment has been said to be a potent factor of fluctuating variability. Knight has pointed out that it is the amount of nourishment which exercises an important influence. But there can be no doubt that the quality of the food is in no way less important. Light and temperature, space and ventilation also require to be carefully considered. The mulberry plants are also in need of light and temperature, soil and space, proper manures and water to contribute to their healthy growth.

Hill stations.

The salutary effects on the silkworm races reared in our hill stations at Kurseong and Kalimpong, have already been mentioned in my previous reports. The experiments conducted there from March to October every year, when compared with the results obtained in the plains with the same races during the corresponding periods, have established the advantages of hill stations. The yield of silk is greatly augmented. In my last year's report I submitted a detailed description and compared the results of different rearings in different periods. Further researches confirm my previous inferences.

As a matter of fact there can be no doubt that with good leaves and favourable weather conditions the increase in the yield of silk per cocoon of our cross races can be satisfactorily effected. The extension of this work will afford greater facilities for rearing on a field scale.

Experimental and Field scale.

The importance of selection has been alluded to before. Primarily selection aims in reducing numbers and eliminates the chances of undesirable individuals from propagating. It is also helpful in obtaining a sufficiently productive and uniform stock to justify commercial production. From the list of selective measures adopted in our research operations, one can see the immense advantage for this work provided it can be carried on a large scale. To quote De Vries, "It is evident that in a variety of mixed conditions, or in the offspring of a hybrid, and even in ordinary fluctuating variability the chance of finding some widely divergent individual increases with the number." He further observes, "In some hundred specimens a valuable sport can hardly be expected, but among many thousands it may well occur."

With a view to work out this problem on a big scale, the Central Sericultural Nursery at Berhampore has been made over to the Research section and the cross races are being reared on a field scale since March 1918. The first crop is over and the figures for the different crosses as compared with the Nistaris are distinctly superior. Miss M. L. Cleghorn has also very kindly sent one of her improved hybrid variety for similar trials. In each case the comparison will be based on similar rearing conditions and feeding with similar leaves. The cocoons have been sent to Mr. J. de Minvielle at Ramnagore. for reeling in his filatures. It is intended to try each race in similar manner for several generations and then selecting the promising varieties for substituting the indigenous races.

With a rearing of 1,090 layings of one of our cross race at the 27th generation we have observed some interesting cases of variation. By isolating and inter-breeding them for some more generations we can expect to get some really helpful mutants. This origin by mutation is conducive to the evolution of new varieties. Mutation manifests itself in the sudden appearance of an individual differing from the parent stock in one or more strongly heritable characters. In the present case this variation has been noticed in the larval markings and also in the colour of the cocoons. The same race reared by families in the experimental side did not offer any such phenomenon in this generation and had it not been for this big rearing we would undoubtedly have been led to assume them as uniform. The total outturn of cocoons from these 1,090 layings came up to 206 *kahons*, or when expressed in actual figures 263,680 cocoons. Excepting 5,868 whitish cocoons all were yellow in colour. All the worms, excepting 448, showed the Nistari larval markings. These 448 worms gave yellow cocoons. Several cocoons of superior yield ranging between three to three and one-fourth grains were similarly selected out. This deviation from the general features hitherto unnoticed when compared side by side with the results obtained by rearing on a smaller scale, conclusively proves the fallacy of an inference based on small rearings with twety-five layings or even fifty. Monsieur Grangeon used to have at least fifty layings, and gradually we had gone up to even one hundred layings with the extension of this work. But even on this scale we could not prevent this deviation. By adopting the method of segregation and methodical selection I expect to find some valuable openings in case further trials prove them to be true cases of mutations. Under the circumstances I refrain from giving any tables to show the general trend of the merits of each race during this year, as the rearing on the field scale during next year will offer greater accuracy and precision. The reeling tests on this scale at the filatures will establish the comparative value of each race and its commercial utility.

Mr. C. M. Hutchinson's investigations on Pebrine and the adoption of his method.—In view of the recent bulletin on the pebrine diseases of silkworms in India by Mr. C. M. Hutchinson, the Imperial Agricultural Bacteriologist, Pusa, I was deputed to Pusa to study the technique of this disease under his

guidance. During this period I had ample opportunities of critically studying many important points in connection with this problem. Further trials of this new method at Berhampore and at Kurseong have convinced me of the greater accuracy of this method for the examination of moths under local conditions. By this research an immense service has been rendered towards the elucidation of this difficult problem. Any one interested in sericulture cannot but feel thankful to Mr. Hutchinson. I consider it highly necessary that this method should be adopted and the fundamental principles of breeding, such as judicious care in the selection of the primary stock races as well as the observance of proper hygienic conditions, etc., should be strictly followed.

Disinfection.

In my last year's report I had incidentally mentioned about the use of Copper sulphate and Formalin for killing the spores of pebrine. Mr. Hutchinson has made several important experiments to ascertain the comparative efficacy of these disinfectants. Copper sulphate has no doubt been used in France and other places for the disinfection of the rearing houses and appliances. But the conditions are not similar. Where the Univoltine races are reared, the rearing houses are not utilised for this purpose for nearly ten months, whereas we have to carry on the rearing throughout the year. There is no evidence to prove that the germs of pebrine can live in the air longer than seven months. So the disinfection of the rearing houses cannot mean that the elimination of pebrine spores constitutes the principal object in those countries. In the various tests emyloyed the superiority of Formalin has been noticed.

PRABHAT CHANDRA CHAUDHURI,
Superintendent of Sericulture, in charge
Sericultural Researches, Berhampore.

ANNUAL REPORT ON SCIENTIFIC WORK IN CONNECTION WITH SILK DONE BY MISS. M. L. CLEGHORN, F.L.S., F.E.S., F.Z.S., ALIPUR (24-PARGANAS) DURING THE YEAR 1917-18.

The multivoltine hybrid race of Italian, Japanese and Nistari cross, started in January 1911, is now in the 61st generation. and during the year has given cocoons usually over 200 to the laying, many over 300, and one over 400, which is good, considering there has been no recrossing for a vast number of generations. The following tables give the generation, number of moth and laying, the date of each *elevage*, and the number of cocoons to each laying, in brackets. Table I is of my Father's hybrid race and gives the descent from No. 3 moth reared in October 1915, No. 329 moth of the succeeding generation, in December 1915, lived 22 days and its descendants still continue to give good results. The parents of the moths and laying No. 26, reared in March 1918, were Nos. 286 and 111, and they gave 327 cocoons. The two moths No. 640 were the parents of No. 286, and they produced 439 cocoons, the paternal parent of No. 640, which was No. 405, goes back to No. 837, reared in May, and No. 837 is descended from moth No. 329, which lived 22 days. The education from November to January, which took very long, being a little over two months, did well as there were 39 sets out of 61 sets with over 200 cocoons.

Table II gives the generations of group 303 reared up to March 1918. In the rearing from November to January there were 13 sets out of 26 sets with over 200 cocoons, many of which were nearly 300 cocoons.

TABLE I.

Pedigree of 329 Hybrid Race.

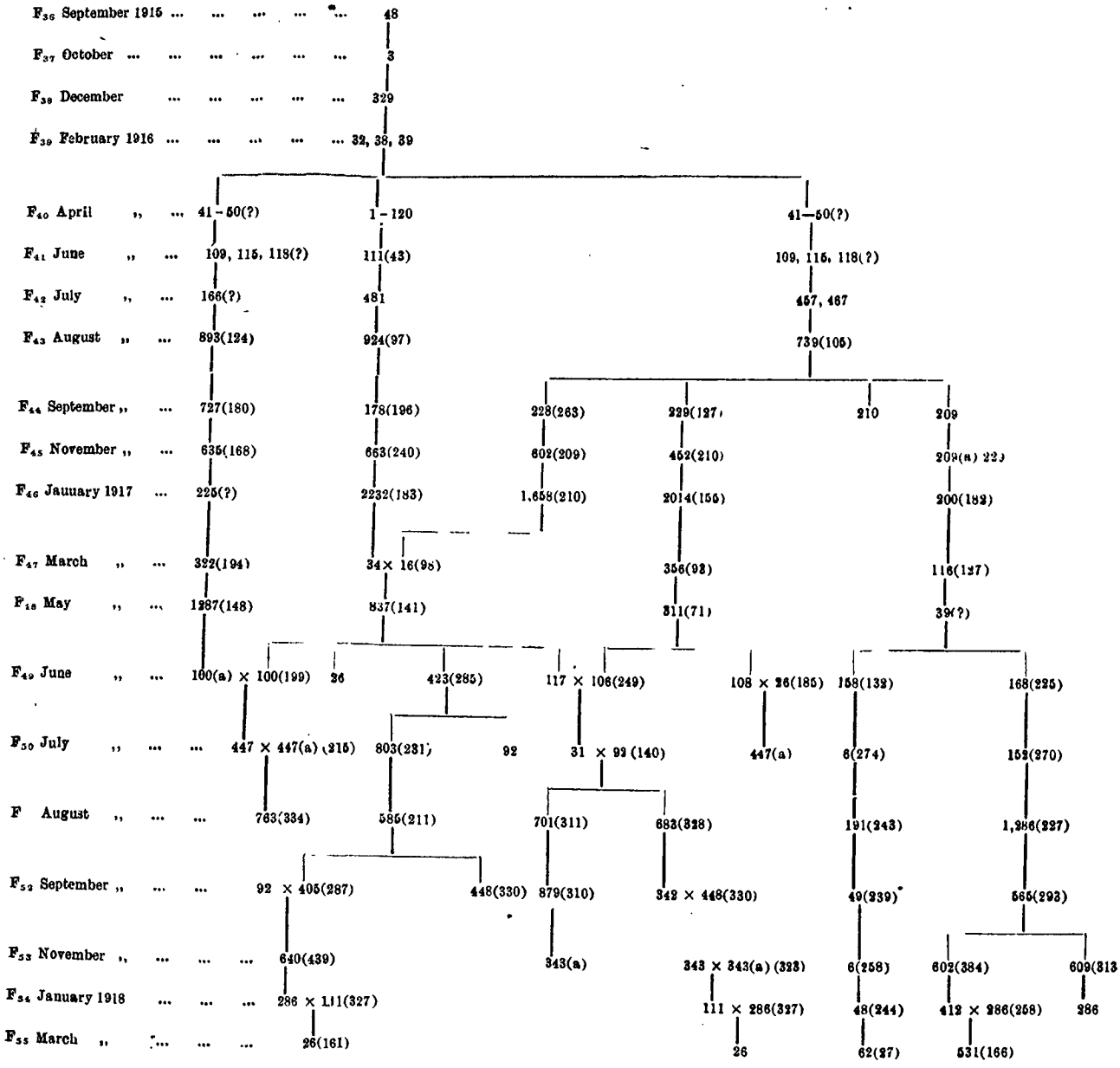
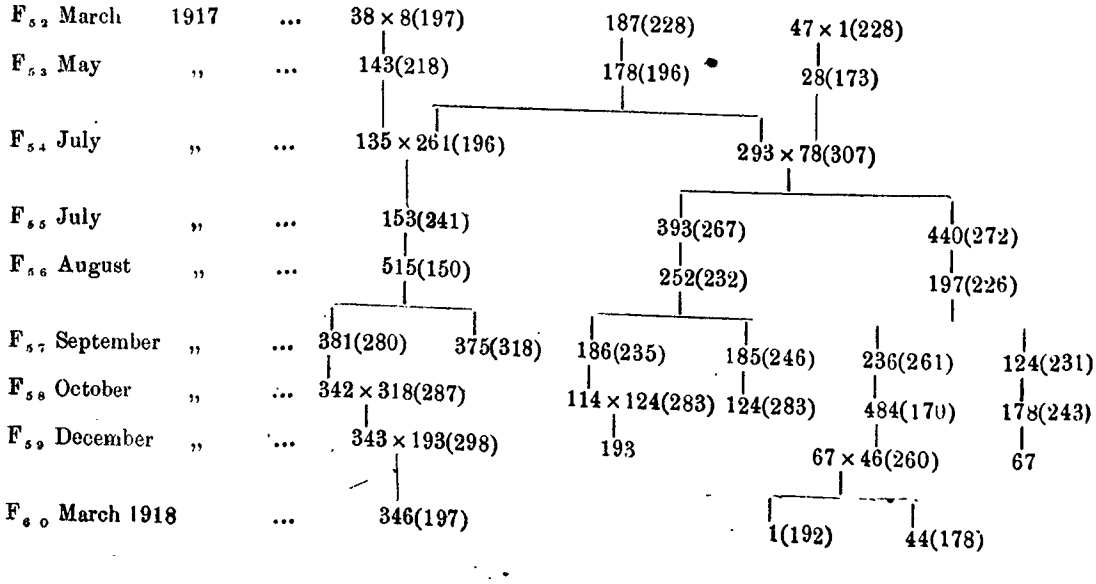


TABLE II.

Pedigree of group 303.



A new plantation of mulberry, of about 6 bighas, was made at Behala last October. One thousand two hundred and forty bushes and small trees were transplanted, and 7,228 rooted cuttings. They are progressing well and with this extra plantation at Behala I hope to have no shortage of leaf in January and February. I have also had a separate plot put down with my Father's thin sween leaved variety of mulberry, and am having this cultivated according to the Bengal system of bush mulberry, the only difference being that the plants are arranged in triangles. I find this arrangement gives the plants most air and prevents overcrowding. The bushes and small trees were also planted out after this style in quincunx order. From this bush plantation of my Father's variety of mulberry I am looking forward to having a supply of good succulent leaf, which will not fade easily during the dry months of February and March. The leaves of this variety have a shiny waxy cuticle, which keeps them fresher than any other varieties of mulberry. Carefully packed, and damped occasionally, they have remained fresh for over three weeks.

I am investigating the various kinds of mulberry to be found under cultivation in India, but have so far only described and made sketches and enlarged drawings of the flowers of 13 kinds. The flowering season of the mulberry tribe is of such short duration that comparative descriptions cannot be made from fresh specimens of all the various kinds in one season. The mulberries seem to have been greatly neglected by Botanists, and much work remains to be done in this direction.

An Albino race of worms has been obtained from a few "green" mutations which appeared about twelve generations back. The worms and moths appear to be devoid of all pigment. The worms are transparent and of a greenish Olour, and the moths have white eyes instead of black. The white-eyed moths have so far produced unpigmented eggs and it will be interesting to see if, when recrossed with a univoltine race, with pigmented eggs, they will still continue to be multivoltine. It would give a clue to the voltine character of the moths for the univoltine character besides being sex-limited in inheritance is invisible in the moth. I hope to try this experiment with a univoltine race in the cold season, so am keeping a small stock of these albinos going. If it is successful a completely multivoltine hybrid race could be quite easily obtained in about two or three generations after recrossing with a univoltine.

I have pleasure in acknowledging the work done during the year by Mrs. L. R. Potter and Miss Gwladys Jull, who have both given me much able assistance. In connection with the breeding experiments with the albino worms my thanks are due to my sister for the help she has very generously given me.

M. L. CLEGHORN, F.L.S., F.E.S., F.Z.S.

ANNUAL REPORT ON THE WORK OF THE SERICULTURAL SCHOOL, RAJSHAHI, FOR THE YEAR 1917-18.

The school was made over to the Government in January 1907; since then it is being managed by a Managing Committee under the Director of Agriculture, Bengal.

The school teaches practical methods of :—

(*a*) Mulberry cultivation.
(*b*) Microscopic seed selection.
(*c*) Detection and prevention of silkworm diseases.
(*d*) Rearing of silkworm.

The school has in possession of 22 bighas of land at Kadirgunj within a mile of the school; of these 17 bighas are under mulberry cultivation. The cocoons grown in this school are gaining popularity among the *Basnis* as these are found to give best results. They take cocoons from this school for their seed.

Four crops of cocoons were raised in this school during the year under report, namely, in April, July and October 1917 and January 1918, amounting to 285 kahons 12 pous of cocoons—of which 11 kahons of cocoons were kept in the school for the microscopic examination in the class and the rest was sold to the *Basnis* of different joars. The receipt was Rs. 500-4 against Rs. 184-5 of the previous year. The increase of sale proceeds was due to a big production of seed-cocoons in the year under report as well as to the rise in the prices of the same in the market.

Teaching staff.—There is a Head Master who teaches sericulture, and with the help of a rearer practical rearing is taught. The headmaster from time to time visited the model rearing houses of passed students, and gave instructions to the village *Basnis* regarding silkworm rearing.

Model nurseries have been started by the ex-students of this school, and arrangements have been made to inspect the nurseries and to see how they fare by rearing silkworm. Quarterly reports of the model nurseries are called for and received. They show that the nurseries are doing well. There are 35 nurseries started by passed students of this school. Of these 8 are in Rajshahi and 27 in Malda.

Students.—There were 10 boys in the beginning of this year. All of them appeared in the final examination and passed. They would receive their rewards in the next winter. Seven boys of the previous year received rewards of the 2nd instalment in the year under report. There were 12 boys on the roll on the 31st March 1918, of whom five are Mahammadans and seven Hindoos. The students cultivate a plot of land measuring one kotta each.

Microscopes.—There are 11 microscopes in the stock.

Receipt.		Rs.	*Expenditure.*		Rs.
Sale proceeds of seed cocoons	...	500	Establishment ...	...	876
Government ...	...	7,019	Stipend ...	...	928
			Appliances ...	...	300
Total	...	7,519	Books and Maps ...	...	17
			Annual repairs, etc.	...	577
			Furniture ..	...	50
			Rewards ...	...	2,150
			Rents and Taxes ...	...	145
			Contingencies ...	...	2,476
			Total	...	7,519

Discipline.—No breach of discipline in connection with the school has come to the notice of the school authorities during the year under report.

Visitors.—The school was visited by the Superintendent of Sericulture, Bengal, on 28th June 1917.

Meetings :—The managing committee held three meetings during the year under report.

K. Banerji,
Secretary, Sericultural School, Rajshahi.

ANNUAL REPORT OF THE WEAVING MASTER, BENGAL, FOR THE YEAR 1917-18.

During the period under review, which consisted of 274 days, I availed of privilege leave for a month and spent 221 days on tour, to visit the following places in connection with works as detailed below. Before describing them, I beg to submit a brief preliminary account of those available raw materials that are being utilized by the textile artisans of Bengal and the improvement of manufacturing processess by innovations that are within the means of poor artisans, who in their existing backward state, possess little means of withstanding commercial competition.

Raw materials used for Textile purposes :—

1. *Cotton.*—Although Bengal is a Cotton-producing Province, the variety of cotton with which they spun and wove "Dacca muslins" of yore, is now almost extinct and the only available cotton that go under the commercial name "Bengal" without specifying any particular locality of its origin, is a produce of Tipperah District, Chittagong Hill Tracts and Garo Hills. This variety is founed so inferior in quality that it can be safely spun into yarn of coarse counts up to No. 10S only. There is very little to say at present regarding "Cotton spinning" as a Cottage Industry in Bengal, as it has been entirely replaced by those spun in mills, leaving the former in a moribund state. Of late, owing to the scarcity of cotton yarn and the abnormal prices quoted for them, people have keenly felt the necessity of cultivating best cotton and to revive also the hand-spinning operation with a view to introduce it as a Cottage Industry, as far as it will be practicable. And so, every arrangement is being made to supply best cotton seed to the intending cultivators and to introduce improved "Churkas" or Spinning-wheels that would facilitate labour and cost. The Spinning mills in India do not produce yarn above No. 50S and with the best Indian cotton, above No. 40S is never attempted to owing to its natural drawbacks. The Bengal wevers use yarn varying from No. 10S to 40s for fabrics of every day use, and when they manufacture finer stuffs higher counts of yarn imported from Manchester and elsewhere are being used. And so, an attempt is being made to utilize the variety of cotton that is readily available in Bengal for the Province itself and to find work for idle hands, by introducing spinning and weaving as home industries.

2. *Wool.*—The principal centres for the manufacture of woollen fabrics are Jangipure, (Murshidabad) the districts of Midina-pore, Bankura, Birbhum, parts of Malda and Darjeeling. The spinning and the weaving appliances are so primitive that the yarn is spun by top spindles and the fabrics are woven into strips of 12 inches wide and brought to the required size by sewing the salvages together. Every attempt is being made to improve their method of manufacture and to introduce such labour-saving appliances that would bring on the desired effect.

3. *Silk.*—The principal silk centres in this Province, where Bengal silk is reared, are :—The districts of Malda and Murshidabad, parts of Rajshahi and Midnapore, Bogra, Rampurhat Sub-Division of Birbhum District, and Bankura. In the above localities the Silk-Rearers either sell their materials to the Reeler in the shape of cocoons or reel them out whereever reeling operation is also conducted. The cocoons are at present reeled in Bengal by means of country reeling machines or *Ghai.* This is provided with smaller swift or reel, and coarse deniers of silk, is often indifferently reeled on it, that goes under the name of *khamru* silk. This is mostly reeled in the District of Malda. The *khamru* silk (or the short skeins) being generally coarse deniers, is often preferred by the local weavers on account of its low price. The weavers re-reel such short-skeins, twist them into required thickness, and then utilize them for weaving purposes. Although, the filatures also have adopted the same methods of reeling, reels of enlarged circumference are employed, and often reel finer deniers of silk with with utmost care. This variety is either locally used for weaving finer stuffs, or exported to foreign markets. Besides the reeled silk that is got, the reelers often cover their cost of labour by the sale of their bye-products such as :—

(1) *Tape waste* (or chasham) the flossy outer covering of cocoons.
(2) *Short Silk Noil* (or Jhut) collected from the reeling basin.
(3) *Bandana*, or the innermost upper layers of exhausted cocoons that are too weak to be reeled and are pure silk without size.
(4) *Nimtar*, or the more unclean last layers of exhausted cocoons.
(5) *Basin waste*, or Pelette as it is locally termed.

These are collected into one form of waste and sold under the usual term *Chasham.* Those rejected cocoons that are not reeled by reelers and the pierced cocoons stored up in the rearers' houses and other useful wastes.

form an excellent raw material for the manufacture of spun thread called *Mutka*. The spinning of this is chiefly undertaken by the female members of the rearers and reelers, to profitably utilize their leisure hours. Besides mulberry silk, wild Tussar cocoons are also available in the Districts of Birbhum and Bankura, and the weavers of those places convert them into yarn and fabrics.

(4) *Jute.*—Although Bengal is noted for its production of jute, the material is not commonly used by the Textile artisans for weaving purposes. It is utilized for ropes and cordages in an extensive scale and to some extent for weaving coarse sacks, as done in the interior parts of Rajshahi and Rangpore Districts. As the Jute Mills have almost completely taken up its manufacture and have begun to supply the materials at a cheaper cost, the artisans do not take the trouble of manufacturing them. As such, I have very little scope to do anything on behalf of this industry, at present.

Having now pointed out the different textile raw materials that are readily available in Bengal and the possible improvements that could be introduced among the artisans with a view to better their existing backward state, the measures that are adopted by me, in order to bring on beneficial results can be dealt with under the following three main heads :—

(1) Financial,
(2) Economical and
(3) Industrial.

As regards (1) I beg to submit that the textile artisans are proverbially poor, and are heavily indebted to the *mahajans*, who live upon the profits of the former. To relieve them out of the clutches of those *mahajans* and to improve the situation, every assistance is being rendered by the Co-operative Department, by organizing Co-operative Weavers' and Reelers' Societies. The Societies that are already in existence have shown satisfactory improvements and the organization of such societies are still on the increase. By the co-operation of the Co-operative Department, the financial stringency of the artisans is being relieved of to a greater extent. The Co-operative Department have also taken up the question of supply of raw materials, such as yarn, etc., to the weavers who are under them and also to dispose of their manufactured fabrics by means of a Supply and Sale Depôt at Calcutta.

As regards (2) and (3) I beg to submit that under the peripatetic demonstrations of improved appliances in connection with textile industries, conducted by me in almost all the selected centres of Bengal, the artisans have been convinced of the advantages of labour-saving machines that fully suited the local conditions and requirements. Most of them have adopted my models, and are always anxious to secure my assistance. I get innumerable requisitions from various quarters of this province and elsewhere for informations regarding improved appliances and accessories and their practical applications. As the artisans are quite aware, that the object of all my earnest endeavours is to improve their pecuniary and professional condition, they have begun to show, in turn, a change in their reluctant attitude and to welcome the adopted measures.

To give necessary and timely instructions to those who have adopted my improved methods and to give a full effect to the adopted measures, I visited the following places in the Province, to attend to works as detailed below :—

1. Birsingpur, Bandirbon, Gopalpur, Katanga, Karida, Thattipara, Raipur, Sukbazar, Abadanga, Tarapore, Baliara, Panchgachia and Kaitha are the places visited by me in the district of Birbhum, where Co-operative Weavers' and Reelers' Societies have been already organized and whose works along with those of other weavers, in general, are being conducted under my supervision and guidance. To the weavers of Birsingpur, Gopalpur, Kaitha and Tattipara, the working of fly shuttle looms and other improved accessories were unknown. With all efforts, the introduction of such improved appliances among them has met with satisfactory results and are being steadily popularized. The looms and other accessories are manufactured at Abadanga and are supplied to all the weavers on Rs. 8. During the Industrial Exhibition at Suri, demonstrations of improved fly shuttle

looms and other pit looms were held to convince the weavers of their working facilities. Further silk and tussar reeling by means of improved reeling machine was also demonstrated. As a result of my earnest efforts, I could register orders to supply 22 fly shuttle looms and other weaving and reeling accessories. The carpenter of Abadanga, who was also present there with his newly prepared looms, could find a ready sale of his looms at the spot and could receive fresh orders for an early supply. The members of the Co-operative Weavers' Societies who exhibited their fabrics of cotton, wool, silk and tussar, were greatly pleased to find their materials sold even before the Exhibition was over.

2. Razgaon, Vishnupur and Bankura are the weaving centres visited by me in the district of Bankura. As the Famine Relief Committee had stopped its working for the time being, the weavers earnestly desired me to organize Weavers' Co-operative Societies amongst them. And so the Co-operative Department have been moved on the matter, and every due consideration is paid by them. The wool weavers at Razgaon have consented to purchase fly shuttle looms and automatic spinning machines at an early date.

3. Madabpasha, Mangalhât, Barisal, Dandobha, Durial are the weaving centres visited by me in the district of Bakarganj, where I conducted weaving demonstrations, etc., on past occasions at the request of local weavers. I suggested to organize weavers' societies, so that, they might get their raw materials on advantageous rates and find less difficulty in disposing of their manufactured goods. The matter is under due consideration.

4. I visited Bogra at the request of the Superientendent of Sericulture to inspect the working of reelers of the locality and to suggest improvements, if any required. I pointed out to them some of the serious drawbacks on the method of reeling and gave instructions to reel out a uniform thread without wastes and broken ends on the skein. The reeling is not carried on an extensive scale as done in Malda and other places. The variety of cocoon being Chottopolu, a finer and more glossy silk could be obtained from it, if reeled with utmost care.

5. The Demonstration of fly shuttle looms conducted by me at Bolkhali, Dholghât, Tattipara and Potia, in the district of Chittagong, rendered the weavers every facilities to improve their method of manufacture. But the majority of the weavers being poor, they expressed their inability to purchase costly looms. The organizations of Co-operative Weavers' Societies are also found impossible as the localities are far beyond the area of the Financing Bank. Under the circumstances, I have made arrangements to supply such improved accessories that are within their means to purchase and to give them necessary instructions by my timely visits.

6. The weavers of Comilla, Manamati, Ghoshnagar, Bellasher and Jafrabad in the district of Tipperah have been rendered both practical help and facilities to study improved methods of weaving by means of successive demonstrations and they are benefited by them. As desired by the Collector and other influential gentlemen of Comilla, I was consulted to open a Weaving School on improved lines to suit the occasion. It was also suggested that the school should impart sufficient practical knowledge on the treatment of cotton from field to factory, by means of easy appliances. A scheme was accordingly prepared and sanctioned by the District Board. The school is being equipped with the necessary appliances, etc., under my supervision and guidance. During the Exhibition held in connection with "Our Day," I conducted demonstrations of fly shuttle looms to the appreciation of local weavers. A few Salvation Army fly shuttle looms that belonged to the District Jail and that they did not know how to work them up, were brought to a correct working order by readjustment of their working parts. The earnest enquiries for improved spinning wheels or " churkas " from many of this district and the neighbouring ones, attracted my attention during the year and an improved automatic has been already prepared and kept at the local artisan school, so that the Superintendent in charge of it could easily make and supply to the intending purchasers, on a cost varying from Rs. 5 to Rs. 15. I am informed that he has received innumerable orders for their supply.

7. Nawabpore, Tattibazar and Kaira are the weaving centres visited by me in Dacca district. The Weavers' Society at Kaira is still worked on the lines of a credit society. Nawabpore and Tattibazar could enjoy the benefit of my practical instructions towards the improvement of their method of manufacture, by my timely visits. A Weavers' Co-operative Society on a firm basis will ere long be started at Nawabpore and it is almost settled.

8. As desired by the Secretaries to the Bhutia Association and the Buddists' Mission, I visited Darjeeling to convene a general meeting of all the local Bhutia weavers and to settle about the organization of a Co-operative Weavers' Society among them. They fully consented to abide by the rules of the proposed bye laws of the Society, submitted requisition and the Society was accordingly registered. As the members and the prime workers of the Society were unwilling to take loans from the Central Bank of Kurseong and liked to be independent, it was resolved to raise the working capital from the influential gentlemen of the locality who were ready to deposit the amount on a nominal rate of interest. A sum amounting to Rs. 1,500 is already collected, and the Society is about to start its working. Besides, I demonstrated to the weavers the method of Tape and Newar weaving and at their request, two special fly shuttle looms to weave Bhutia-chadars, etc., are being constructed.

9. Faridpur, Gopalgange, Rajbari, Bhanga, Nurpur, Najirpur and Paschim Sadardhi, are the principal centres visited by me in the district of Faridpur, to conduct practical demonstrations to the weavers and to induce them, to adopt fly shuttle appliances, to their advantage. During the Industrial Exhibition at Faridpur, I demonstrated the working of such fly shuttle looms to the benefit of the weavers in general. The Co-operative Weavers' Societies organized by me at Nurpur, Nazirpur, and Paschim Sadardhi, have continued to receive my practical instructions and timely help. As the Central Bank of Faridpur could not provide funds to start more societies within this area the matter has been postponed for the present.

10. English Bazar, Perozpur, Shujapur, Gayazabari and Kaliachuck, are the principal reeling centres visited by me in the district of Malda. The method of reeling by means of improved reeling machine was demonstrated to the reelers, so that they could copy out those improvements at a nominal cost. Besides the timely instructions given by me during the actual season of their work, I helped the reelers to manufacture better and uniform kind of thread. At Sibganj, where silk weaving is carried on extensively, the weavers were supplied with improved weaving accessories and instructions for their adjustment, by which better kind of cloth is being turned out and is readily sold.

11. Bazitpore in the subdivision of Tangail and Bazitpore in Kishorganj are the centres having co-operative weavers' societies in the district of Mymensingh. Tangail weavers and those under the society are carrying on their work, and every assistance as to the facilities on the working methods is given. But the weavers have suffered much owing to the scarcity and exorbitant prices of fine numbers of yarn. As desired by the Subdivisional Officer of Kishorganj, and arranged by him, I introduced the working of flyshuttle looms there for the first time and taught them their method of working also. The looms are in thorough working state and are being appreciated and popularized. They weave at present dhoties and sarees of fine counts up to No. 60S with those looms.

12. Beldanga and Soampara are the silk reeling centres; Berhampore, Baluchur, Kagra and Mirzapur are the centres for silk weaving; Gopalnagar, Ragunathganj and Jangipore are centres for wool weaving in the district of Murshidabad. The Soampara and Beldanga reelers having expressed their idea to improve their system of reeling, adopting filature systems and doing away with their Khamru reeling machines, I visited the localities and suggested to follow my improvements on the existing reeling machines as far as practicable, or to make new ones on improved lines. To the wool weavers surrounding Gopalnagar, where a co-operative wool weaver's society is already in existence, it was arranged to send flyshuttle looms and other accessories from Abadanga. As they have told me that their chief difficulty is to spin woollen yarn to a uniform thickness, they were promised to send improved

spinning *churka* from Comilla, and that being ready now, I am sending one as soon as possible.

13. Ramjibanpur and Anandapur are the weaving centres visited by me in the district of Midnapore. Inspected the working of woollen weavers and gave them practical instructions on the method of scouring, bleaching and spinning wool and to prevent it from insect-bites. At Anandapur, the tussar weavers wanted my help in introducing flyshuttle looms to weave tussar cloths. I have arranged accordingly to weave their cloth by means of flyshuttle slays adjusted in their pit looms. As improved reeds and shuttles have become very scarce in these days, I could not supply them according to their demand, and I have arranged to get them from Japan and Manchester as soon as possible.

14. Feni, Purvachandrapur and Azizfazilpur are the weaving centres visited by me in the district of Noakhali to see how far the weavers have adopted my improvements as a result of my demonstrations, and I found them working in a progressive state.

15. Serajganj, Nuthen Bharenga, Bagchor, Eadarukpore, Tarabaria and Gangarampore are the principal weaving centres visited by me in Pabna district. The Bharenga Weavers' Society having been dissolved, the weavers residing at Eadarukpore, Bagchor and the neighbouring villages, have consented to start a co-operative weavers' society on a stronger and substantial basis. Major portion of the weavers have been given facilities to acquaint themselves with the working of flyshuttle looms by my demonstrations, etc. As soon as the society is started and its regular work is begun it is proposed to get flyshuttle looms for their use and to realize the cost by instalments. At present they are being induced in every way to start a society by my frequent visits to supervise their works. The weavers' society at Tarabaria have not yet begun its working, as it is not financed by the Pabna Central Bank. The weavers of Tarabaria and Gangarampur are given facilities to improve their manufacturing condition by rendering them my timely supervisions and other necessary advices.

In conclusion, I beg to state that during the year under report much special attention was paid towards the improvement of manufacturing appliances, which the weavers in general greatly stood in need of. To meet their demand either fresh ones were supplied, or suitable improvements were introduced on the existing ones, wherever they were possible. As far as time and opportunities could permit, I made frequent visits to the abovementioned weaving and reeling centres with a view to rectify their practical difficulties which they experienced in the course of their works, to give them timely instructions and advice, and also to insinuate them to derive the full benefits of thrift, self-help and co-operation.

N. N. PILLAY,
Weaving Master.

B. S. Press—18-7-1918—2775—750—R. F. & A. B.

GOVERNMENT OF BENGAL.

REVENUE DEPARTMENT.

Agriculture Branch.

RAMNA (DACCA), THE 24TH JULY 1918.

RESOLUTION—No. 759 T.R.

READ—

(*i*) The Report of the Department of Agriculture, Bengal, for the year ending the 31st March 1918.

(*ii*) The Reports of the Expert Officers of the Department for the same period.

THE period covered by the annual report of the department has been altered from the year ending the 30th June to that ending the 31st March, because the 30th June falls in the middle of the season of the autumn crops. The period under review this year is, therefore, one of nine months. On the 1st March 1918 the headquarters of the Director of Agriculture were transferred from Calcutta to Dacca. The scientific work of the department has become largely centralized at the Dacca Farm, and it is, therefore, advantageous that the Director should be in very close touch with the work carried on there. Mr. S. Milligan was in charge of the department throughout the year. The Presidency is still without the services of Mr. Annett, Agricultural Chemist, and Mr. McLean, Deputy Director, Eastern Circle, who have been absent since the autumn of 1916, the former on work connected with the war, and the latter on military duty. Babu Rajeswar Das Gupta, Superintendent of Agriculture, was appointed to officiate for Mr. McLean in the Eastern Circle in November 1917, and the Governor in Council is pleased to observe that in the opinion of the Director his promotion has been justified. Mr. F. Smith was in charge of the Western Circle throughout the year; and Mr. Finlow, Fibre Expert, supervised the work of the Chemical Section throughout the period under report and that of the Botanical Section until Mr. Hector's return from leave in October 1917. As in previous years there was a Superintendent of Agriculture in each of the five divisions. The number of District Agricultural Officers on the 31st March 1918 was twelve, or three in excess of the number on the 30th June 1917. In January 1918 the Government of India approved of a scheme for the formation of a service of District Agricultural Officers. In submitting this scheme the Governor in Council expressed the opinion that an agency of this nature is an essential element in agricultural progress in Bengal, and contemplated the ultimate appointment of a District Agricultural Officer in every district, and the establishment at the headquarters of each district of a small farm of which the Agricultural Officer should be in charge. The reports now under review indicate the extent to which the District Agricultural Officers employed in 12 districts and the farms at Chinsura, Burdwan, Rajshahi, Rangpur and Kalimpong, apart from the Central farm at Dacca, have contributed to the progress attained up to date.

2. The number of students from Bengal at the Sabaur College was 17 as in the previous year. Mr. Milligan remarks on the importance for agriculture in Bengal of questions of irrigation, terracing and drainage and on the need for improving the technical efficiency of the agricultural as distinct from the scientific side of the department, either by recruiting from those having an engineering training, or by training agriculturists in engineering.

3. The normal area under rice in Bengal is 22,024,600 acres, the most important crop being winter rice which represents 75 per cent. of this area, while autumn rice accounts for 23 per cent. and summer rice for 2 per cent.

Satisfactory progress has been made in extending the distribution of *Indrasail* seed for transplanted winter rice. In 1917 2,000 maunds were distributed in 5-seer packets in the districts of Dacca and Mymensingh on the condition that an equal quantity of seed should be returned to the department. This condition has been strictly fulfilled ; and if, as is hoped, at least 20 per cent. of the produce has been reserved by the cultivators for use as seed in 1918 sufficient seed will be available for 100,000 acres. Arrangements have been made for the distribution of 5,300 maunds of *Indrasail* seed on the same lines in 1918. The *Nagra* variety of transplanted winter rice has proved successful at the Chinsura Farm and arrangements have been made for initiating its distribution in the same manner in Western Bengal. *Kataktara* autumn rice which has done well at the farms is now under trial in districts of Western and Eastern Bengal with a view to subsequent distribution if results are satisfactory. The examination of long-stemmed deep-water varieties of winter rice in a special tank at the Dacca Farm has been initiated during the past year. Remedies for the *ufra* disease of broadcast winter rice have continued to receive the attention which they deserve, and the Mycological Collector has been chiefly employed on this work. The scientific study of the parasite has been further pursued by the Imperial Mycologist at Pusa. As explained in last year's report it has been established that the parasite survives in the stubble from year to year between harvest and sowing. The remedy is to deprive the parasite of the stubble on which it lives, and the problem is to find means for applying this remedy. The problem is sought to be dealt with by two alternative methods, the removal of the stubble by burning and thorough cultivation, and the elimination of the stubble by substituting a different crop. Moderate success has been obtained in *ufra*-infected fields by stubble burning, but the crops on the fields so treated are liable to infection from neighbouring fields. At Pubail, a place notorious for *ufra* in Dacca district, a piece of low-lying land was terraced into two levels, and in place of deep water winter rice, summer rice was grown on the lower area and jute on the higher area. The cost of this work as carried out by the department was prohibitive ; but the experiment may induce cultivators to try similar methods for themselves, and they can probably do the work more cheaply. As Mr. Milligan observes, existing methods of *bhil* cultivation are primitive, for the land hardly becomes dry before the sowing season, and the problem is to a great extent one of field engineering.

4. The crop of second importance to rice in Bengal is jute which is normally grown on an area of 2,643,800 acres. The *Olitorius* variety is grown in the Presidency and Burdwan Divisions and in Rajshahi district of the Rajshahi Division, and the *Capsularis* variety in the Dacca and Chittagong Divisions and in the remaining districts of the Rajshahi Division. One hundred maunds of the selected *Kakya Bombai* seed (*Capsularis*) were distributed in 1917 in ½-seer packets in Dacca and Mymensingh districts on the condition that the recipients should sow the seed separately and keep the whole of the produce for seed for the next year, the produce of 1917 being estimated to give sufficient seed for an average jute holding in 1918. Special care was taken to explain what was intended ; and it is satisfactory to learn that 90 per cent. of those who obtained seed kept enough for their own requirements this year, and that seed sufficient for 30,000 acres was in the hands of cultivators of Dacca and Mymensingh at the beginning of 1918. About 600 maunds have been similarly distributed in 1918 in these two districts and in the remaining important *Capsularis* districts of Tippera, Faridpur, Rangpur, Pabna and Bogra. The tests of *Kakya Bombai* against local varieties initiated in 1916 on fields provided by the local agencies of jute firms were continued in 1917, the comparative plots being reversed. In 1916 the average superiority of *Kakya Bombai* was 3 maunds per acre, and in 1917 it was 2 maunds per acre, giving a net average superiority of 2½ maunds, a result which has more than justified Mr. Finlow's claim that his selected seed was better than average local varieties by 1½ maunds per acre. Tests at Chinsura and Rajshahi have established as suitable for Western Bengal and Rajshahi a variety of *Olitorius* jute, known as R. 26 ; and 12 maunds of seed were distributed in small packets for sowing

in 1918. Among experiments with manure for jute those in connection with potash are of the greatest interest. The efficacy for jute of potash obtained from the water hyacinth has been established, and potash has been found to be a preventive of the disease Rhizoctonia, which is a phenomenon of potash starvation common in the red soils of Eastern Bengal. Further experience with water hyacinth ash has shown that stunted hyacinth plants do not contain a high enough proportion of potash to make it profitable to convert them into ash for sale, and that such plants should be rotted and used locally for manure, only deep water plants being converted into ash. The soil survey of the Presidency has been continued : as would be expected the old alluvium (red laterite soil) has the most marked deficiencies, the red soil of Eastern Bengal lacking phosphoric acid, lime and potash, and that of Western Bengal lacking the two former elements. Mr. Finlow has been led by the shortage of flax to make experiments with sunn hemp which promise valuable results. Jute is not strong enough as a substitute for flax for the manufacture of canvas, and sunn hemp in its normal state is too rough for spinning. Mr. Finlow has elaborated a softening process which makes sunn hemp fibre suitable for spinning, and the suitability of the thread for canvas is now under investigation.

5. The work on sugarcane has shown satisfactory progress. Out of 51 varieties selected for tests, 41 have been eliminated. The tests which are applied are sugar content and fitness for local conditions, which vary greatly throughout the Presidency. Among exotic canes Yellow Tanna and Java 247 have proved successful and of local varieties *Gandari* (Dacca), *Vendamukhi* (Rajshahi) and *Samsara* (Burdwan) are the most popular. The exotic canes give the best yield but are inclined to deteriorate. There is an increasing demand for sugarcane cuttings from the Government farms, and though nearly 500,000 were distributed during the year the demand far exceeds the supply. New farms at district headquarters will facilitate the supply of this demand. In the meantime the assistance of local agriculturists in growing superior cane with a view to the distribution of cuttings by sale is much needed ; and the Governor in Council would be glad if members of Agricultural Associations would undertake this business of distribution.

6. The policy laid down by Government for the Rangpur Cattle Farm is being followed. During the year a pedigree Hansi bull was purchased from the Cawnpore Military Dairy Farm, and there are two full grown Bengal bulls, and 99 cows on the farm. Seventy-one cows were purchased during the year to replace those which were not considered to be of good enough quality. Two distinct herds are maintained, one of indigenous cattle and the other of cross bred : the change of bulls is reported to have brought about an improvement in the stock. On the cultivable area of the farm fodder crops are now chiefly grown.

7. The report affords evidence of the increasing interest which is being taken by the general public in the work of the department. The assistance of the local agents of jute firms has been invaluable to Mr. Finlow in testing his *Kakya Bombai* seed. The good work of the District Agricultural Associations of Rangpur, the 24-Parganas and Malda, of the Thana Agricultural Associations in Birbhum, and of the Panchayats in Dacca district has earned the thanks of the officers of the department. Mr. Smith's report shows that the District Associations in most districts of Western Bengal suffer from the want of District Agricultural Officers to help them in their work. He reports that in each district there are earnest workers whose numbers can easily be increased when officers are available to help them.

8. The continued rise in the prices obtained for home reeled silk is reported to have resulted in a considerable increase in the area under mulberry in Bengal. The effects of improved prices are also shown in the financial results of the supply of seed-cocoons from the Government nurseries, the receipts for the nine months under review being Rs. 32,563 compared with Rs. 16,829 and Rs. 28,737 in the full years 1915-16 and 1916-17. Nevertheless Babu A. C. Ghose, the Superintendent of Sericulture, reports that the silk industry is rapidly disappearing in Bogra district on account of the high wages of labour and the superior attraction of jute. Sericultural work was continued on the same lines as in previous years. The new features of the

work were the introduction of the more accurate method of detecting pebrine in moths advocated by the Imperial Agricultural Bacteriologist, and the setting apart of the Sericultural Nursery at Berhampore for testing on a practical scale the races of silk worms which have been reared by Mr. P. C. Chaudhuri, who is carrying on M. Grangeon's work, and by Miss Cleghorn. The results of these trials will be awaited with great interest. The Governor in Council has not yet received the opinion of the Provincial Silk Committee on the recommendations of Mr. Lefroy, late Imperial Silk Expert.

9. The report of the Weaving Master is of special interest this year on account of the widespread efforts which are being made to revive the home spinning and weaving industries as a remedy for the shortage of cotton cloth. Mr. Pillay has endeavoured to introduce improved "Charkas," or spinning wheels, and looms, and he assisted the Tippera District Board in the equipment of a new technical school, and supplied model "Charkas" which are now being produced locally. In the Kishorganj subdivision of Mymensingh district he introduced flyshuttle looms and the weavers are now turning out *dhotis* and *saris*. In consultation with the Co-operative Department he has assisted the purchase of raw materials and the disposal of manufactured articles. Mr. Pillay's report shows that he has visited all the principal weaving centres in the Presidency and has given much practical assistance, and the Governor in Council has no doubt that his efforts will be widely appreciated.

10. Mr. Milligan's report speaks for itself of the many-sided activities of the department which is in his charge and of the valuable work which is being done. The Governor in Council has much pleasure in acknowledging his services and those of the officers who have assisted him, and the support which has been given to him by numerous private individuals.

By order of the Governor in Council,

L. BIRLEY,

Secy. to the Govt. of Bengal.

No. 6182.

Copy forwarded to the Director of Agriculture, Bengal, for information.

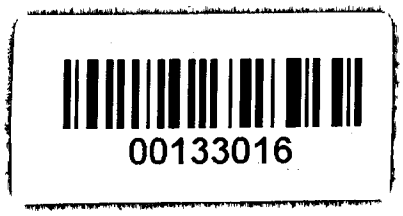
By order of the Governor in Council,

M. A. MOMEN,

Under-Secretary to the Government of Bengal.

Ramna (Dacca);
Revenue Dept.—*Agri.*,
The 24th July 1918.

B. S. Press—29-7-1918—1200J—1,600—S. C R.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